
GPS AutoSteer System

Installation Manual



MFWD with Steering Valve

AGCO

Supported Models

RT100A	DT180A
RT110A	DT200A
RT120A	DT220A
RT140A	DT240A
RT155A	
RT165A	
RT180A	

Challenger

Supported Models

MT525B	MT635B
MT535B	MT645B
MT545B	MT655B
MT555B	MT665B
MT565B	
MT575B	

Massey Ferguson

Supported Models

7465	8450
7475	8460
7480	8470
7485	8480
7490	
7495	

LEGAL DISCLAIMER

Note: Read and follow ALL instructions in this manual carefully before installing or operating the AutoSteer system.

Note: Take careful note of the safety information in the Safety Information section and throughout this manual.

The manufacturer disclaims any liability for damage or injury that results from the failure to follow the instructions and warnings set forth herein.

Please take special note of the following warnings:

1. There is NO obstacle avoidance system included in the manufacturer's product. Therefore, users must always have an operator on the equipment when the AutoSteer system is in use to look for any obstacles including people, animals, trees, ditches, buildings, etc.
2. During installation of the AutoSteer system and during the Calibration and Tuning processes, the vehicle's wheels turn from side to side and the vehicle moves. Be sure that all people and obstacles are clear of the vehicle before installation, calibration and tuning, or use of the AutoSteer system.
3. Use of the AutoSteer system is NOT permitted while the vehicle is on public roads or in public areas. Ensure that the system is OFF before driving on roads or in public areas.

Special Requirements

Tools

This list consists of the tools required to complete the installation. The installer is assumed to have a complete set of common installation tools.

1/8" Allen wrench	11/16" stubby open wrench	17mm stubby open wrench
5/32" Allen wrench	3/4" stubby open wrench	22mm stubby open wrench
3/16" Allen wrench	13/16" stubby open wrench	12mm open wrench
1/4" Allen wrench	15/16" stubby open wrench	14mm open wrench
#2 Phillips screwdriver, standard	3/8" open wrench	16mm open wrench
1/2" socket and ratchet	1/2" open wrench	17mm open wrench
15/16" socket and ratchet	9/16" open wrench X2	19mm open wrench
T40 Torx socket and ratchet	5/8" open wrench	22mm open wrench
Oil catch pan	11/16" open wrench	24mm open wrench
Cleaning brush	3/4" open wrench	32mm open wrench
Cleaning rags	13/16" open wrench	13mm socket, extension, and ratchet
Ladder, 10 ft (3 m)	15/16" open wrench	17mm socket and ratchet
Tape measure, 12 ft (3.7m) minimum	1/2" ratchet wrench	24mm socket and ratchet
Ohm meter	9/16" ratchet wrench	19mm socket and breaker bar
Metal hack saw	Wire cutter small	22mm socket and breaker bar
Cable puller pole		



Safety Information



Warning Alerts



The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:



- As the operator of the vehicle, you are responsible for its safe operation.
- The steering system is *not* designed to replace the vehicle's operator.



Note: Verify that all screws, bolts, nuts, hose connections, and cable connections are tight after the final installation of the AutoSteer system on the vehicle.



	<div data-bbox="657 730 919 772"> WARNING</div> <p data-bbox="435 806 1065 890">To avoid electrical shock hazards, remove the Roof Module from the vehicle before driving under low structures or low electrical power lines.</p>
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	<div data-bbox="657 1056 919 1098"> WARNING</div> <p data-bbox="435 1134 1065 1218">Ensure that you are in a stable position on the vehicle platform when installing or removing the Roof Rail and Roof Module so you do not fall.</p>
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	<div data-bbox="657 1386 919 1428"> WARNING</div> <p data-bbox="435 1463 1065 1547">To prevent accidental death or injury from being run over by the vehicle, never leave the vehicle's operator chair with the AutoSteer system engaged.</p>
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	<div data-bbox="657 184 919 226"> WARNING</div> <div data-bbox="589 249 888 279">High-Pressure Fluid Hazard</div> <div data-bbox="431 279 1049 388">Read the user manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.</div>
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	<div data-bbox="657 537 919 579"> WARNING</div> <div data-bbox="431 606 1049 716">To understand the potential hazards associated with the operation of AutoSteer equipment read the provided documentation before installing the AutoSteer system on a vehicle.</div>
---	---



	<div data-bbox="657 869 919 911"> WARNING</div> <div data-bbox="431 938 1065 1047">To prevent the accidental engagement of the AutoSteer and loss of vehicle control while driving on roads, shut down the AutoSteer system (exit the program). Never drive on roads or in public areas with the AutoSteer system turned on.</div>
--	--



	<div data-bbox="657 1199 919 1241"> WARNING</div> <div data-bbox="431 1268 1060 1377">Do not stand next to the wheels or move the machine while adjusting the pressure relief valve. Turn off the engine and engage the parking brake before standing under or next to the machine.</div>
---	---



Caution Alerts

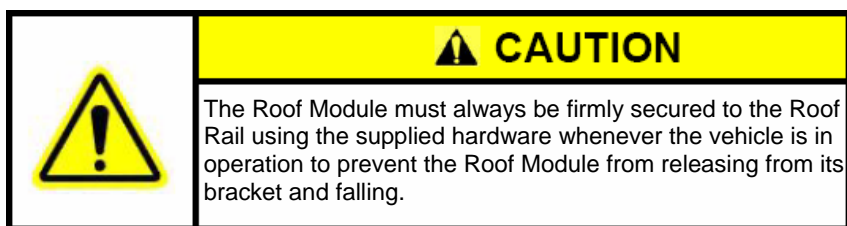
The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:

	 CAUTION
	The Roof Module must be removed when transporting or driving the vehicle at speeds above 30 mph (48 km/h). The Roof Module can possibly detach due to wind loads at higher speeds.

	 CAUTION
	The AutoSteer system does not detect obstacles in the vehicle's path. The operator must observe the path being driven in order to avoid obstacles.

	 CAUTION
	When engaged, the AutoSteer system controls only the steering of the vehicle. The operator must control the speed of the vehicle.

	 CAUTION
	The AutoSteer system must be powered OFF when installing or removing the Roof Module.



Vehicle Requirements

The vehicle must be equipped with a fully functional Power Beyond System. The Power Beyond system provides the following hydraulic ports on the rear of the vehicle:

- Pressure
- Return/Tank
- Load Sense

The vehicle steering and hydraulic systems must be in good working order before installing the AutoSteer system. Check for loose or worn parts. Drive the vehicle and confirm that it steers straight and the wheels can be turned from lock to lock. Check the steering system hydraulic hoses and connections to ensure there are no oil leaks.

The vehicle electrical system and battery must be in good working order.

The vehicle should be fully cleaned before installing the AutoSteer system. A clean vehicle will improve the overall installation and cable routing and will also reduce the chance for oil contamination when the hydraulic connections are opened.

Important Information

This installation manual contains valuable information for servicing the AutoSteer system. After the installation is complete, store this manual in a safe place for future reference.

Note: Verify that all screws, bolts, nuts, hose connections, and cable connections are tight after the final installation of the AutoSteer system on the vehicle.

This installation requires that the pressure relief valve on the Steering Valve be adjusted after the system has been installed but prior to calibration and tuning. After a preliminary hydraulic leak test, follow the procedure for setting the pressure relief valve.

Technical Support

Refer to your Display user manual for technical support information.

Contact Information

Refer to your Display user manual for contact information.

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Installation Overview

The **Installation Overview** chapter information is provided in the following sections:

- *Vehicle Inspection*
- *Kit Overview*
 - *Kit Components*
 - *Assemblies*
- *Installation Procedure Outline*
- *Cable Diagram*

This installation guide describes the installation of the AutoSteer system on several models of AGCO, Challenger, and Massey Ferguson MFWD vehicles with an AutoSteer Steering Valve. The AutoSteer installation kit PN: 188-0003-01 is used on the following vehicles:

- AGCO Small Frame (RT100A, RT110A, RT120A, RT140A, RT155A, RT155A, RT165A, and RT180A)
- AGCO Large Frame (DT180A, DT200A, DT220A, and DT240A)
- Challenger Small Frame (MT525B, MT535B, MT545B, MT555B, MT565B, and MT575B)
- Challenger Large Frame (MT635B, MT645B, MT655B, and MT665B)
- Massey Ferguson Small Frame (7465, 7475, 7480, 7485, 7490, and 7495)
- Massey Ferguson Large Frame (8450, 8460, 8470, and 8480)

Note: This installation manual is for vehicles with closed center hydraulic systems only. Small Frame vehicles produced before 2008 were built with an option to have an open centered hydraulic system instead. This kit does not support the installation on those types of vehicles. If the vehicle has a CVT transmission, it is a closed center system. If the vehicle does not have a CVT transmission, always verify the hydraulic system on the vehicle prior to installing the AutoSteer system.

The vehicle specific sub-assemblies for the vehicle series are listed in *Table 1-1*.

Note: If you are installing an electric steering wheel actuator such as OnTrac II, skip the Steering Valve, SA Module, and SA Module Harness installation information in this manual and refer to your electric steering product manual for further instructions.

Vehicle Inspection

Before installing the AutoSteer system, confirm the vehicle's steering system is in good working order. Drive the vehicle and verify the vehicle's correct working order. Also, ensure the following system operations and components:

- Check to see if you can turn the steered wheels from lock to lock.
- Ensure the vehicle steers straight.
- Check for loose or worn steering components.
- Ensure the hydraulic fluid level is correct.
- Service the vehicle if the steering is not in good working order.

Kit Overview

This Kit Overview section is divided into sub-sections for each of the assemblies and their components are described in the following sections.

Kit Components

This assembly is shown in Figure 1-1 and its components are defined in Table 1-1.

Figure 1-1 Installation Kit Components (PN: 188-0003-01)

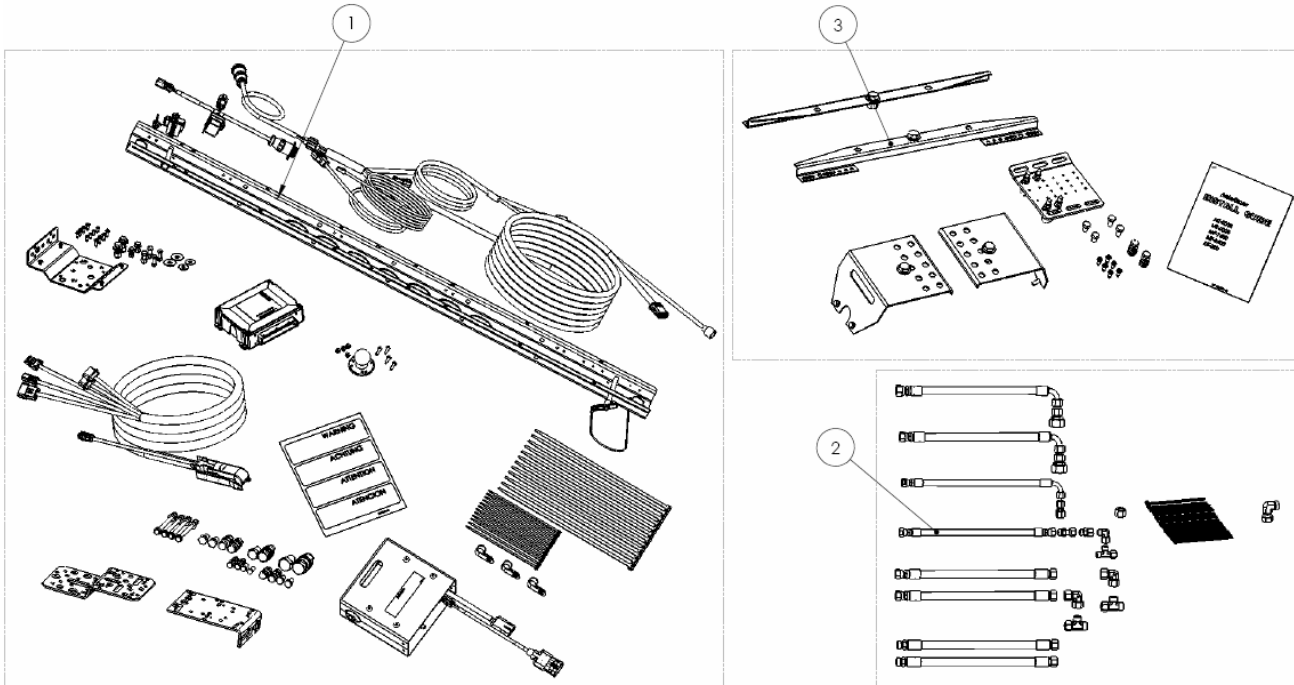


Table 1-1 Installation Kit Component Descriptions (PN: 188-0003-01)

Item	Component	Part Number
1.	Steering Valve Kit	153-0001-01
2.	Hose Kit	500-0286-01
2.	Bracket Kit	152-0003-01

Assemblies

This vehicle installation kit contains the following components:

- Steering Valve Kit Components
- Hose Kit Components
- Bracket Kit Components

Steering Valve Kit Components

Figure 1-2 Steering Valve Kit Components (PN: 153-0001-01)

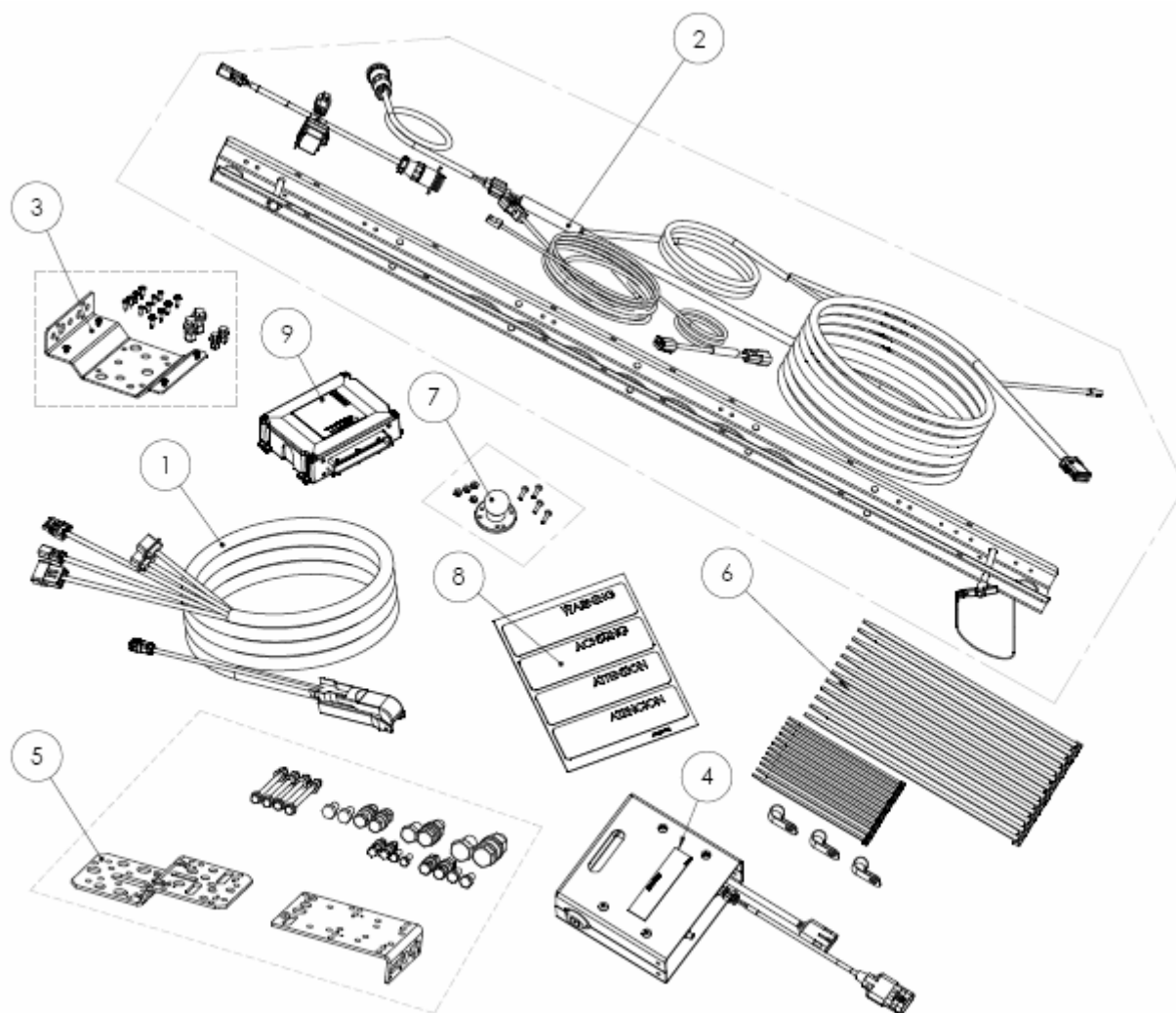


Table 1-2 Steering Valve Kit Components (PN: 153-0001-01)

Item	Component	Part Number
1.	SA Module Harness – Wheeled	201-0371-02
2.	Common Installation Kit	201-0497-02
3.	SA Module Bracket	200-0190-01
4.	Steering Valve Assembly	200-0457-01
5.	Steering Valve Bracket Kit	200-0434-01
6.	Mounting Hardware	200-0076-01
7.	Display Mounting Base Assembly	200-0508-01
8.	Warning Labels	603-0074-01
9.	SA Module Assembly	200-0206-01

Hose Kit Components

Figure 1-3 Hose Kit Components (PN: 500-0286-01)

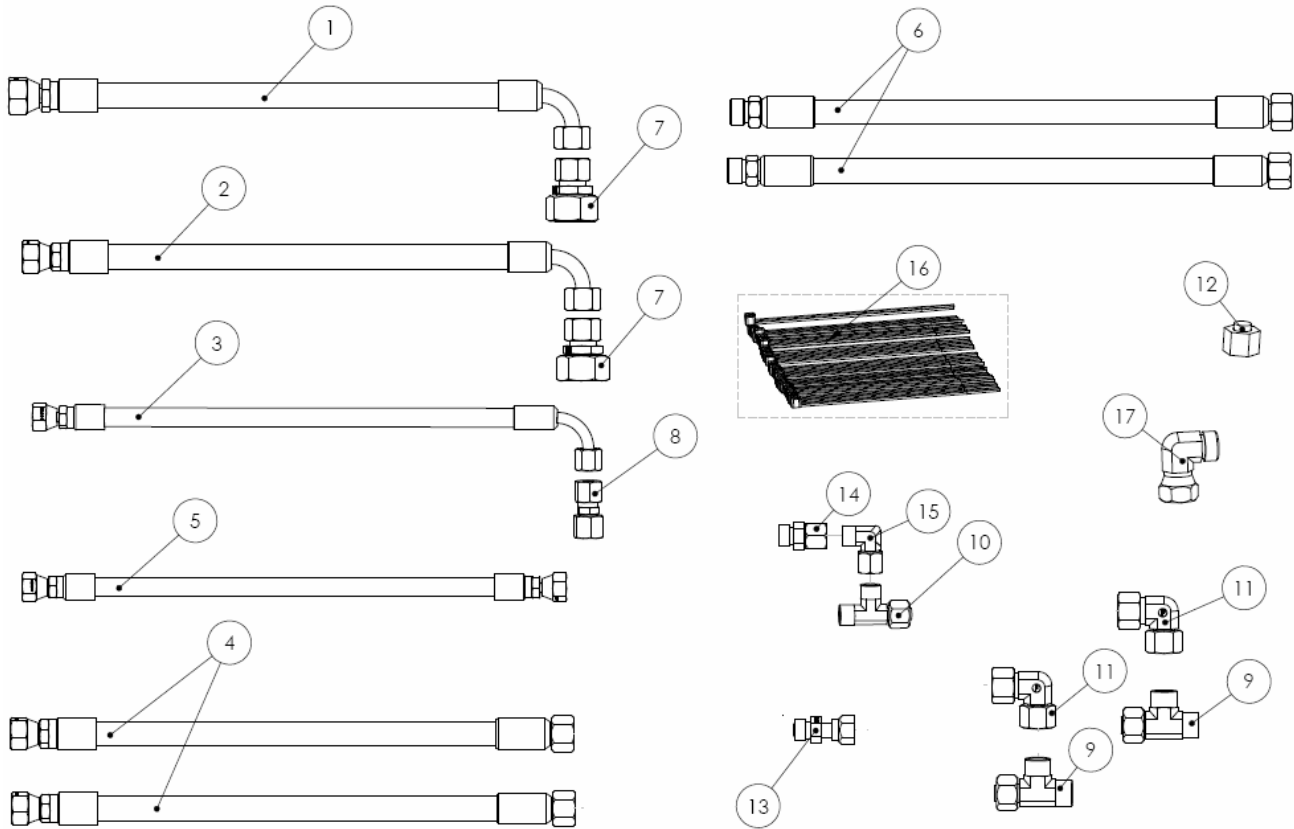


Table 1-3 Hose Kit Components (PN: 500-0286-01)

Item	Component	Part Number	When to Use
1.	Hose, 3/8" x 20" -8F ORFS x -12LFM 90	F451TC-JCC5081206-20	All
2.	Hose, 3/8" x 20" -6F ORFS x 12L FM 90	F451TC-JCC5061206-20	All
3.	Hose, 1/4" x 20" -4F ORFS x 8L FM 90	F451TC-JCC5040804-20	All
4.	Hose, 3/8" x 110" -6 ORFS x -12L FM	F451TC-JCC3061206-110	All
5.	Hose, 1/4" x 110" -4F ORFS x -4F ORFS	F471TC-JCJC040404-110	All
6.	Hose, 3/8" x 70" 12L FM x 12L M	F451TC-C3DO121206-70	When teeing into the front axle connections instead of Orbitrol
7.	Reducer, 18L x 12L	RED18/12LA3C	All
8.	Reducer, 10L x 8L	RED10/8LA3C	All
9.	Adapter, Run Tee 12L M18	EL12LA3C	All
10.	Adapter, Run Tee 8L M14	EL08LA3C	All
11.	Adapter, Elbow 12L 90 Deg.	EW12LA3C	All
12.	Cap, 12L	VKA12A3C	Large Frame Installs
13.	Orifice, 0.031" -4M ORFS x -4F ORFS	4LOHL60.031	All
14.	Adapter, 8L x -4M ORFS	4-8L LOHU86	All

Item	Component	Part Number	When to Use
15.	Adapter, Elbow 8L 90	EW08LA3C	All
16	Cable Ties	200-0467-01	All
17.	Adapter, Elbow -8 90 Deg.	8 C6LO	Small Frame Installs

Bracket Kit Components

Figure 1-4 Bracket Components (PN: 152-0003-01)

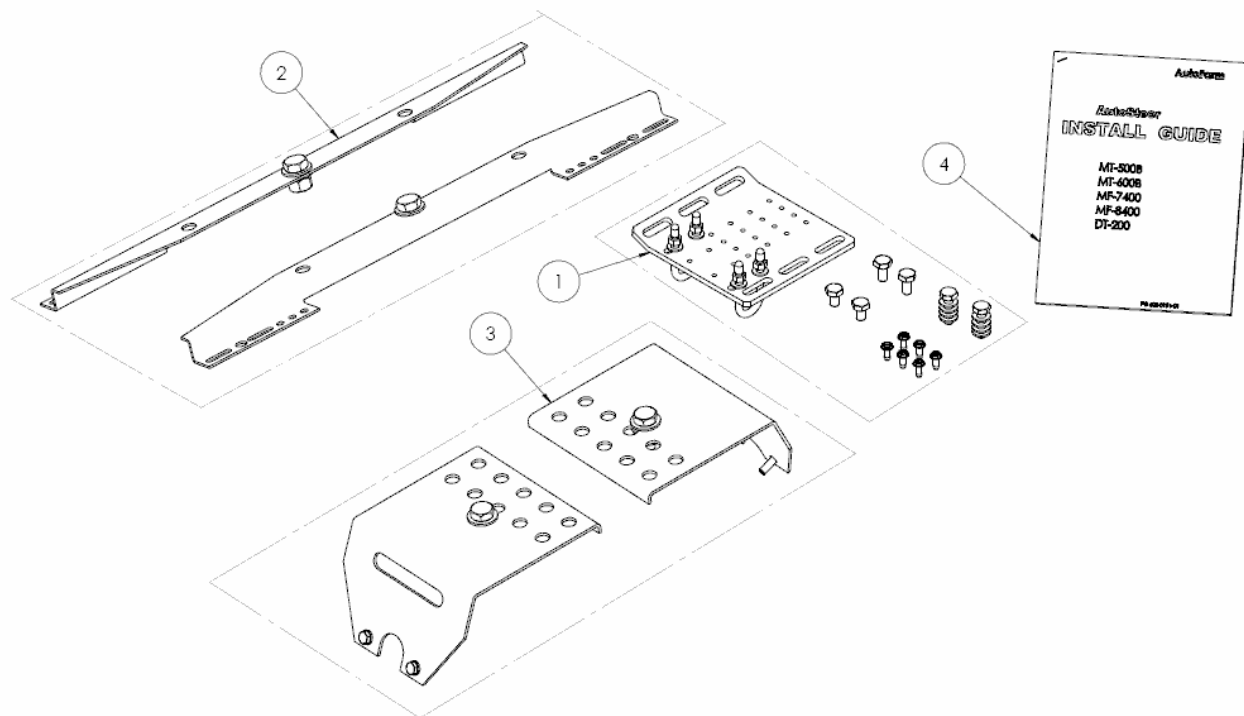


Table 1-4 Bracket Kit Components (PN: 152-0003-01)

Item	Component	Part Number	When to Use
1.	Display Bracket Assembly	200-0469-02	All
2.	Roof Module Brackets	200-0387-02	Challenger
3.	Roof Module Brackets	200-0455-01	AGCO, Massey Ferguson
4.	Install Guide	602-0191-01	All

Installation Procedure Outline

1. Verify shipped components.

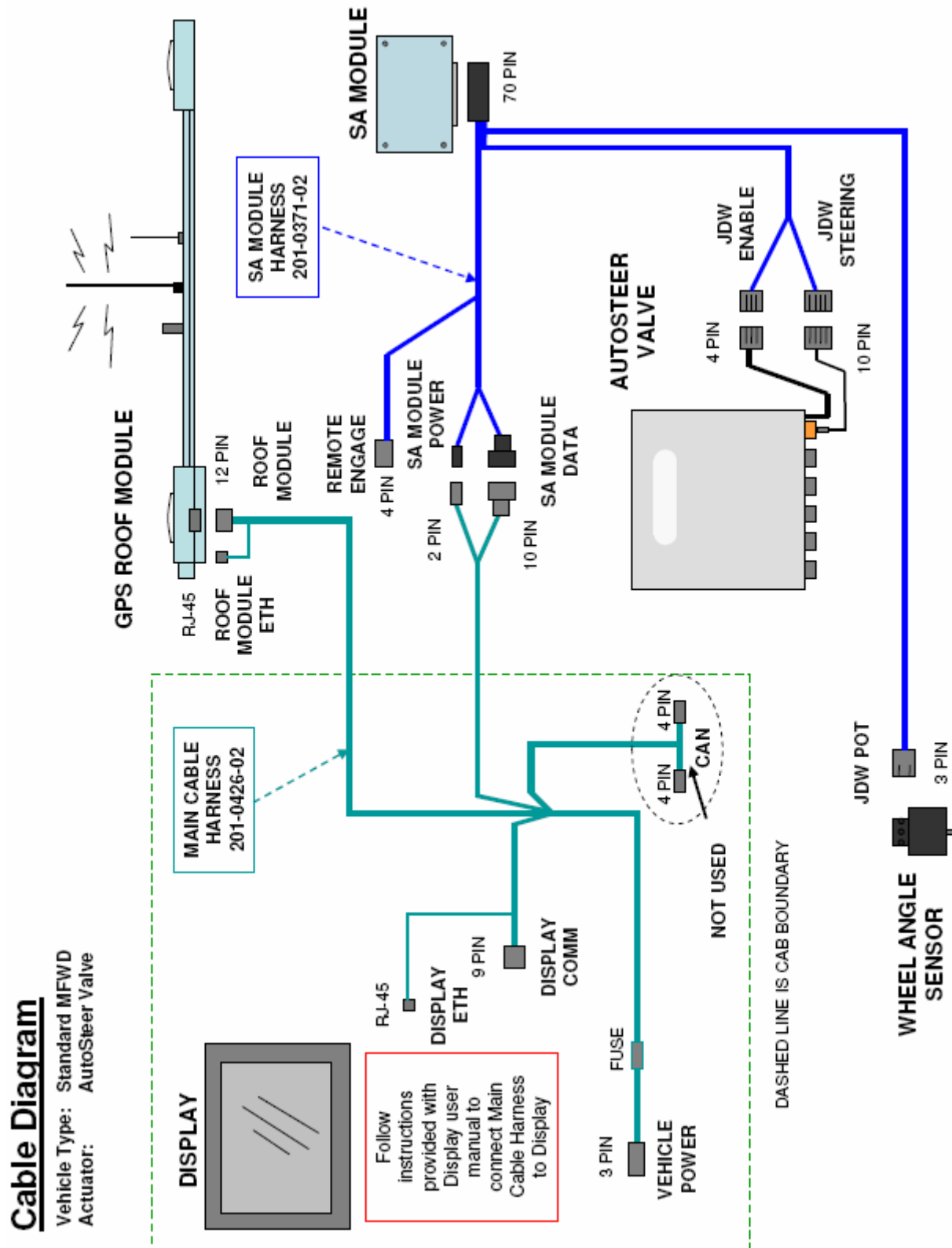
Note: *Step 2, Step 3, Step 4, Step 5 and Step 9* are skipped if installing an electric steering actuator.

2. Install Hydraulic Steering Valve Assembly.
3. Install Hydraulic Hoses.
4. Install the Wheel Angle Sensor (Optional).
5. Install the SA Module.
6. Install the Roof Rail on the cab roof.
7. Install the Roof Module on the Roof Rail.
8. Install the Display Mounting bracket in the cab.
9. Install the SA Module Harness.
10. Install the Main Cable Harness.
11. Install the Display using a RAM Mount Arm.
12. Connect the Main Cable Harness to the Display connections (Display Comm, Display Eth, and Vehicle Power)

Note: Instructions for connecting the vehicle kit cables to the Display can be found in the Display user manual.

13. Verify that all connectors are properly coupled and secured.
14. Start the vehicle and check for oil leaks.
15. Power ON the AutoSteer system.
16. Adjust the pressure relief valve on the Steering Valve
17. Calibrate the vehicle.
18. Tune the vehicle.
19. Verify the system has been installed properly and operates satisfactorily.

Cable Diagram



Steering Valve Installation

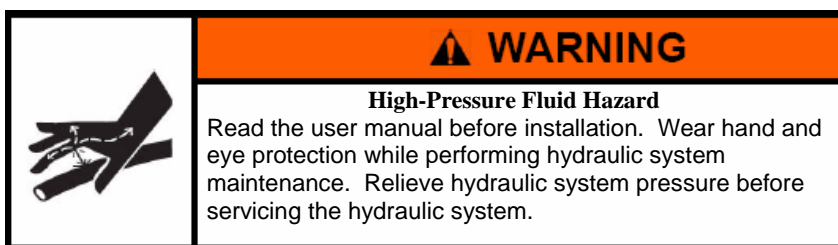
The **Steering Valve Installation** chapter information is provided in the following sections:

- *Steering Valve Installation Procedure Overview*
- *Verify a Power Beyond Kit has been Installed*
- *Prepare the Steering Valve for a Power Beyond Installation*
 - *Steering Valve Front Ports Overview*
 - *Valve Preparation Procedure*
- *Install the Steering Valve*
 - *Small Frame Models*
 - *Large Frame Models*
- *Hydraulic Hose Overviews*
 - *Steering Valve Port Overview*
 - *Hose Connection Overview*
- *Hydraulic Hose Connection Procedure*
 - *Small Frame Power Beyond Connections*
 - *Large Frame Power Beyond Connections*
 - *Open Small Frame Vehicle Hood*
 - *Open Large Frame Vehicle Hood*
 - *LS Orbitrol Connections (Option 1)*
 - *LS Orbitrol Connections (Option 2)*
 - *Steering Line Hose Connections at Orbitrol (Option 1)*
 - *Steering Line Hose Connections at Front Axle (Option 2)*
 - *Connect Pressure Transducer Harness*
- *Adjusting the AutoSteer Pressure Relief Valve*
- *Installation Checklist Before Proceeding to Startup*

Note: Only technicians trained for hydraulic valve installations should perform the installation procedures in this chapter. If the vehicle requires a hydraulic Steering Valve to be installed ensure a trained technician is available for the installation.

Steering Valve Installation Procedure Overview

1. Verify a Power Beyond kit has been installed on the vehicle.
2. Prepare the Steering Valve for a Power Beyond installation.
3. Install the Steering Valve bracket and Steering Valve on the vehicle.
4. Connect the six hoses between the Steering Valve and the vehicle.
5. Check for oil leaks.
6. Perform a manual functional test to confirm correct Steering Valve operation.



Verify a Power Beyond Kit has been Installed

This installation requires that a Power Beyond kit be installed on the vehicle prior to installing the Steering Valve. The Power Beyond kit provides the required ports for Pressure, Return, and Load Sense. The Power Beyond kit should be installed from the factory. The small frame models and large frame models have a slightly different configuration. Figure 2-1 shows an example of the ports on the back of the small frame model. Figure 2-2 shows an example of the ports on the back of a large frame model. On some vehicles the Load Sense port will also have a special fitting that connects it to another port on the back of the vehicle. An example of this is also shown in Figure 2-2.

If the Power Beyond kit has not been installed on the vehicle, contact the vehicle's service provider to have the kit installed prior to continuing with this installation.

Figure 2-1 Small Frame Power Beyond Ports

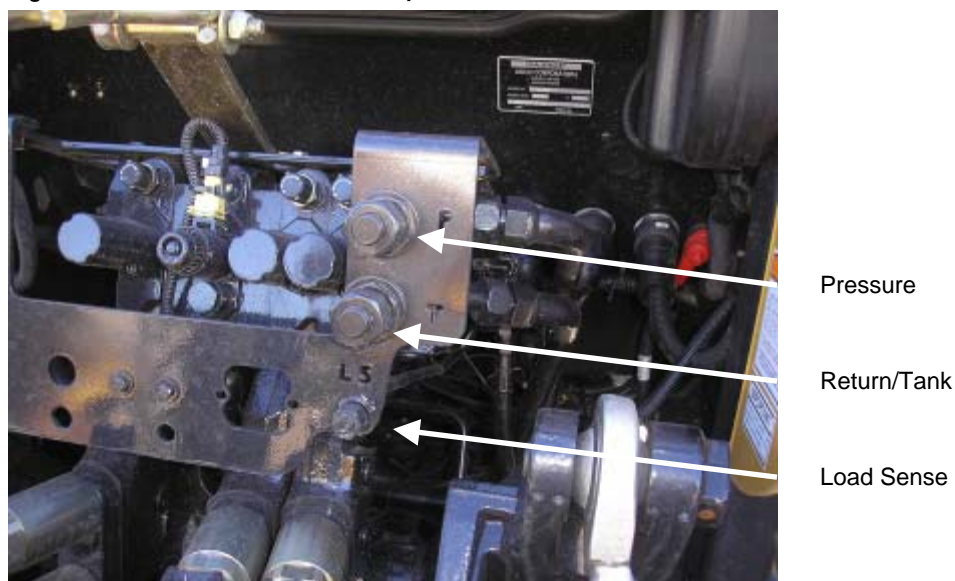
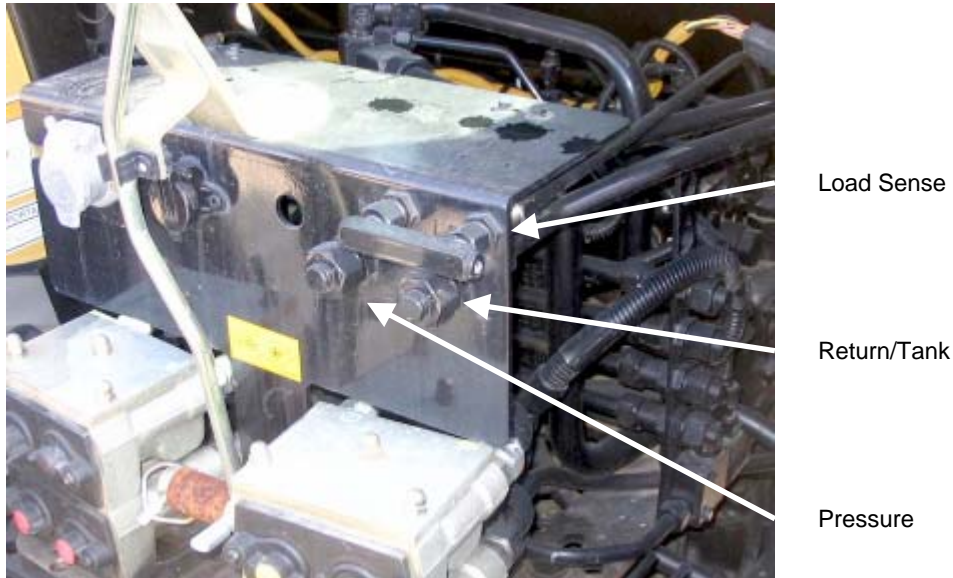


Figure 2-2 Large Frame Power Beyond Ports



Prepare the Steering Valve for a Power Beyond Installation

Prior to installing the Steering Valve on to the vehicle, the Steering Valve must be configured for use on a Power Beyond system. This requires the installer verify the proper plugs and orifices have been installed in the access ports on the Steering Valve itself. This installation also requires that a bleed down orifice be installed in the Steering Valve. This bleed down orifice allows the Load Sense pressure to bleed down after the Steering Valve no longer requires oil flow. This procedure can be performed after the valve has been installed on the vehicle; however it is much easier to do this prior to the installation.

Steering Valve Ports Overview

Figure 2-3 shows the ports on the front and side of the Steering Valve that will be accessed after the front cover has been removed. There are other ports and orifices on the Steering Valve, but the ones described here are the only ones that will need to be modified for this installation. A 0.022" Orifice will be installed in Port **13A** to allow the Load Sense to bleed down. A plug is inserted into Port **13B** to allow the valve to work in a Power Beyond installation.

Table 2-1 shows the factory default positions of all the access ports and the positions they should be in for a Power Beyond installation. Port **13C** is not accessed in this installation and thus not identified in Figure 2-3.

Figure 2-3 Ports on the Front and Side of Steering Valve

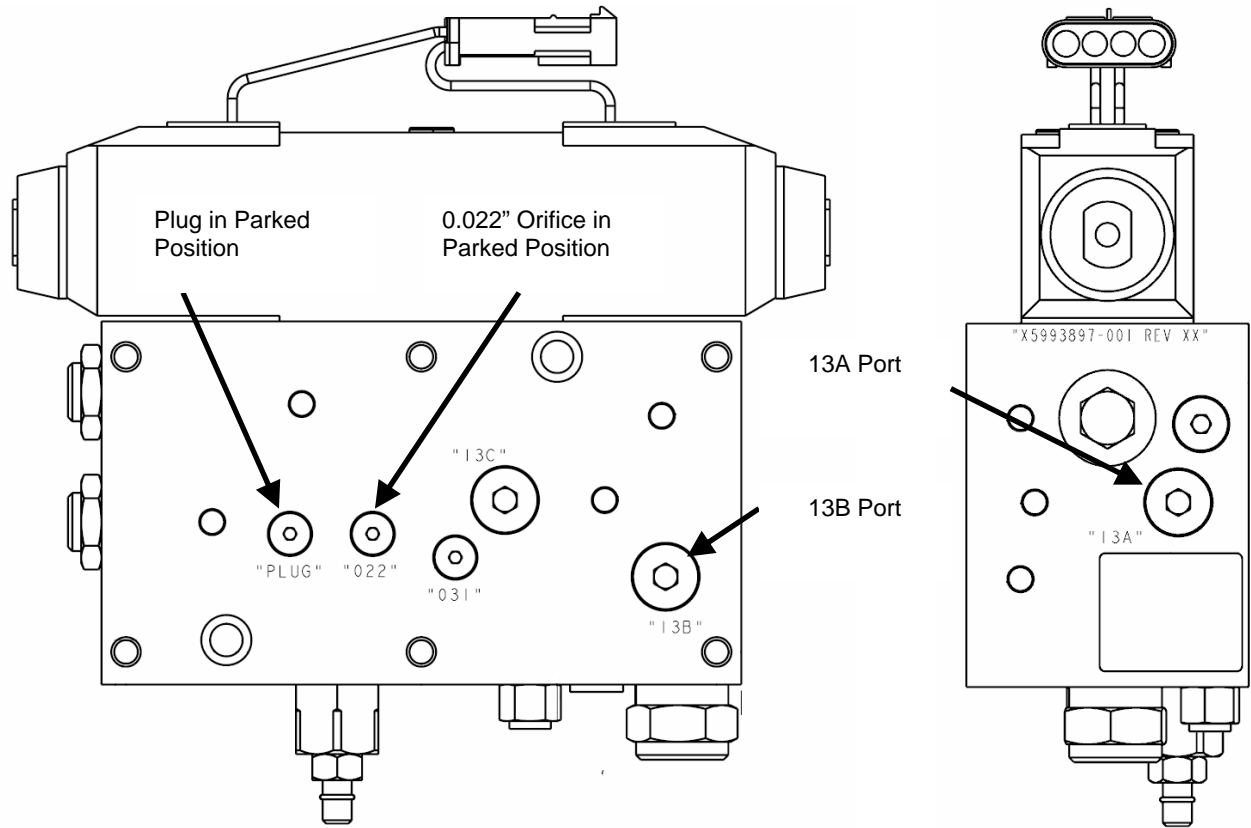


Table 2-1 Plug and Orifice Configuration Summary

Type of Installation	13A	13B	13C
Factory Default Configuration	Plug	Open	Plug
This Vehicle Configuration	0.022" Orifice	Plug	Plug

Valve Preparation Procedure

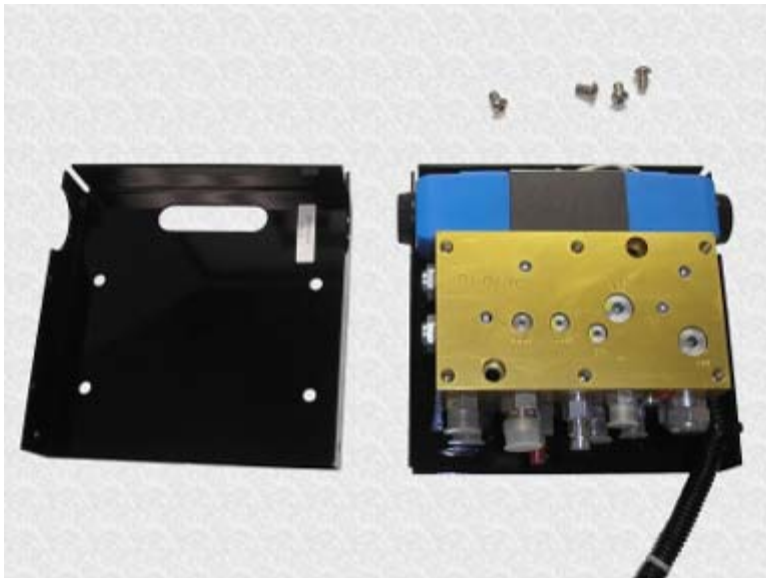
1. Place the Steering Valve on a flat surface. Remove the four cover screws with a 3/16" Allen wrench. See Figure 2-4.

Figure 2-4 Remove Front Panel Screws Steering Valve



2. Remove the front cover and screws and save them for the final reassembly after the Steering Valve has been installed on the vehicle. See Figure 2-5.

Figure 2-5 Front Cover Removed

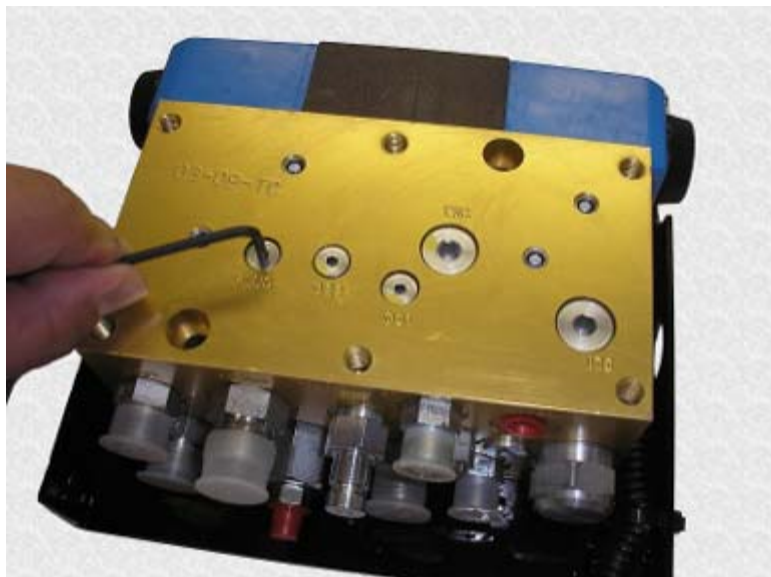


Prepare the Steering Valve for a Power Beyond Installation

3. Locate the Plug stored in the parked position on the Steering Valve body and remove it with a 1/8" Allen wrench. See Figure 2-6.

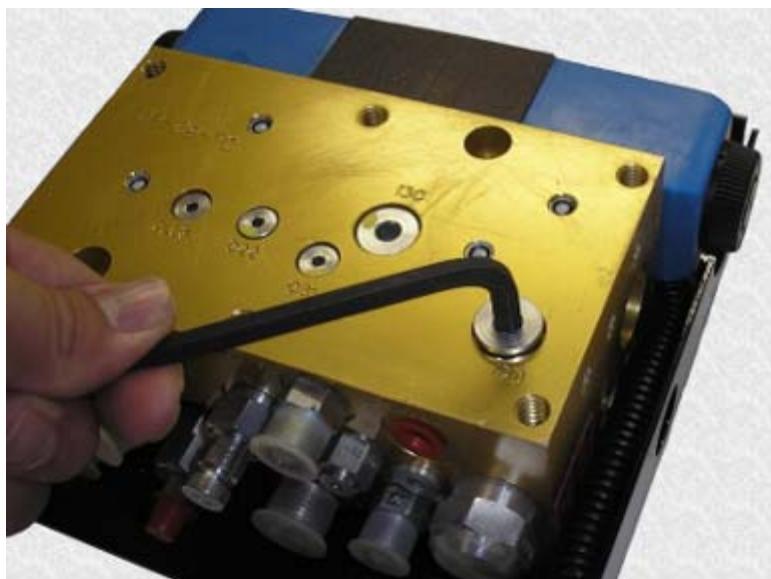
Note: The plugs, orifices, and port access plugs are very tight. Loosening them could take a considerable amount of force. Verify that your tools are in good shape prior to attempting this procedure.

Figure 2-6 Remove Plug from the Valve Body



4. Locate the 13B port on the Steering Valve and remove the access port with a 1/4" Allen wrench. See Figure 2-7.

Figure 2-7 Remove the 13B Access Port



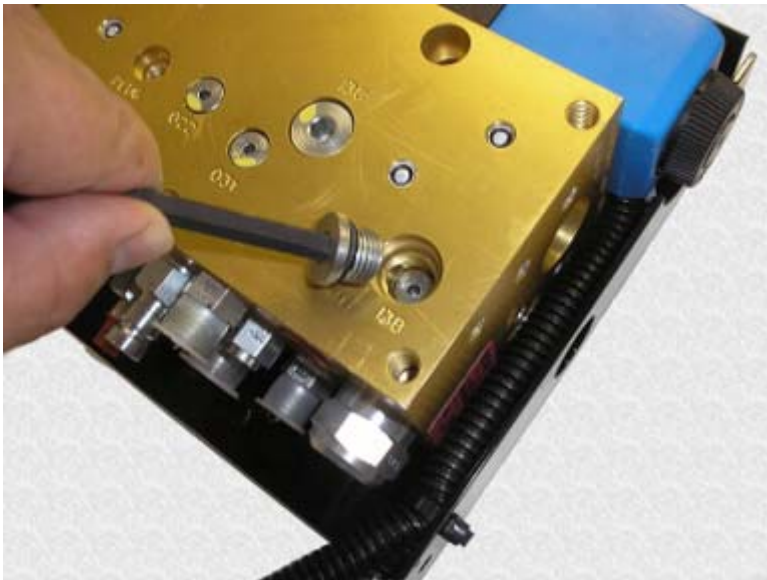
5. Install the Plug removed in Step 3 into the bottom of port **13B** and tighten it with a 1/8" Allen wrench. See Figure 2-8.

Figure 2-8 Install the Plug into Port 13B



6. Replace the access port plug into Port **13B** and tighten with a 1/4" Allen wrench. See Figure 2-9.

Figure 2-9 Replace the Access Port



7. Locate the **13A** port on the side of the Steering Valve and remove the access port with a 1/4" Allen wrench. See Figure 2-10.

Figure 2-10 Remove Port 13A Access Port



8. Identify the plug already installed in the bottom of this port. See Figure 2-11.

Figure 2-11 Identify the Plug in Bottom of Port



Existing Plug

9. Remove the existing plug with a 1/8" Allen wrench. See Figure 2-12

Figure 2-12 Remove Existing Plug from Port 13A



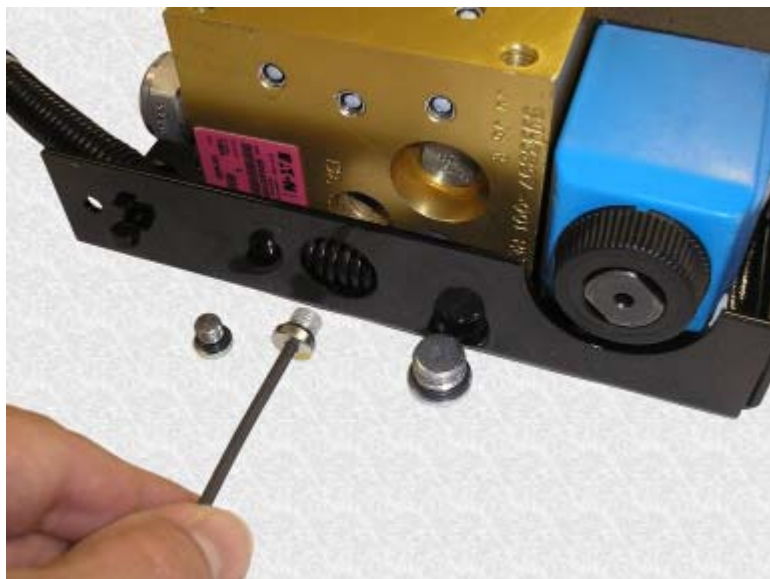
10. Locate the **0.022" Orifice** stored in the parked position on the Steering Valve body and remove it with a 1/8" Allen wrench. See Figure 2-13.

Figure 2-13 Remove 0.022" Orifice from the Valve Body



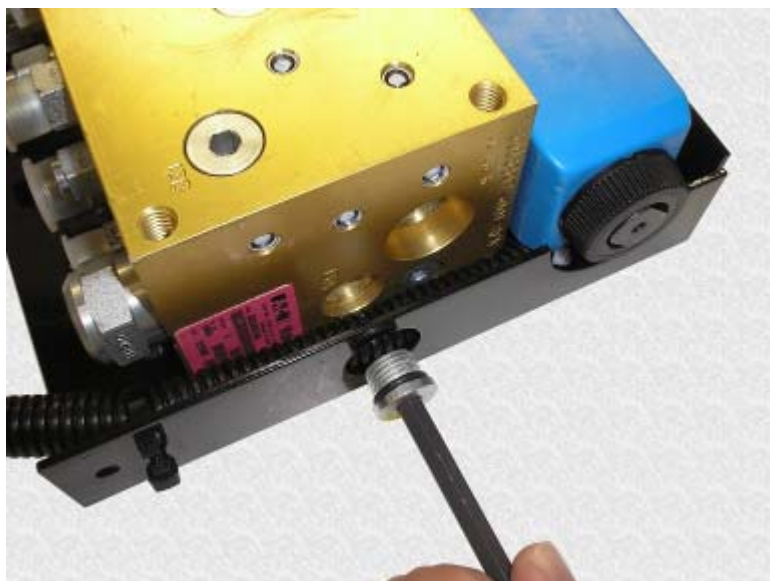
11. Install the **0.022" Orifice** removed in Step 10 into the bottom of port **13A** and tighten it with a 1/8" Allen wrench. See Figure 2-14.

Figure 2-14 Install the 0.022" Orifice into Port 13A



12. Replace the access port plug into Port **13A** and tighten with a 1/4" Allen wrench. See Figure 2-15.

Figure 2-15 Replace the Access Port



13. Place the plug that was removed from Port **13A** in the parked position on the Steering Valve block marked Plug. See Figure 2-16.

Figure 2-16 Plug Inserted in to Steering Valve Block



Plug Parked

Note: The following step is optional. However, it is recommended on the large frame vehicles as it is easier to install the Pressure Transducer prior to mounting the Steering Valve on the Vehicle. On the small frame vehicles, this step can be performed either before or after installing the valve.

14. Remove the plug from the **TRANS** port and attach the pressure transducer. Tighten the pressure transducer with a 3/4" wrench as shown in Figure 2-17.

Figure 2-17 Install Pressure Transducer



Pressure Transducer
Installed

15. The valve is now ready to install on the vehicle.

Install the Steering Valve

The Steering Valve is installed on the rear of the vehicle above the hydraulic remote connections. A universal valve bracket is secured to the vehicle. The small and large frame vehicles have different brackets available to attach to so the valve is mounted differently. The small frame vehicles also have two cab options, a low profile, and a high profile, which causes the distance between the cab and the mounting area to be different. On low profile installations, the installer must also ensure there is enough clearance between the cab and the valve after the installation to prevent any damage. The procedures for mounting on both frame types are provided below. Use the procedure for the vehicle that the system is being installed on.

Small Frame Models

1. Locate the metal bracket on top of the remotes shown in Figure 2-18. There are two long slotted holes on the far left side of the bracket where the Steer Valve will be mounted.

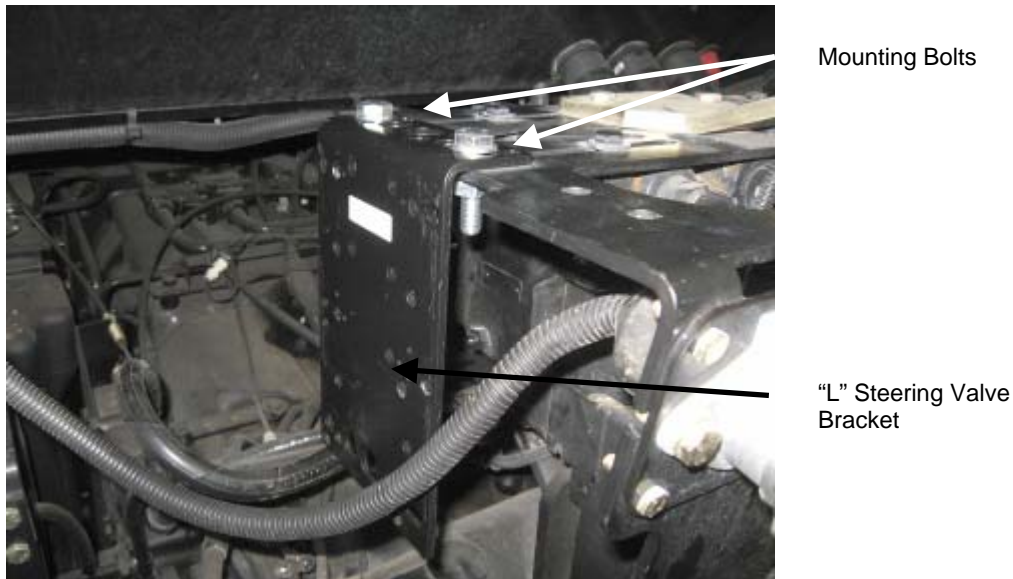
Figure 2-18 Steering Valve Mounting Location



Steering Valve
Mounting Point

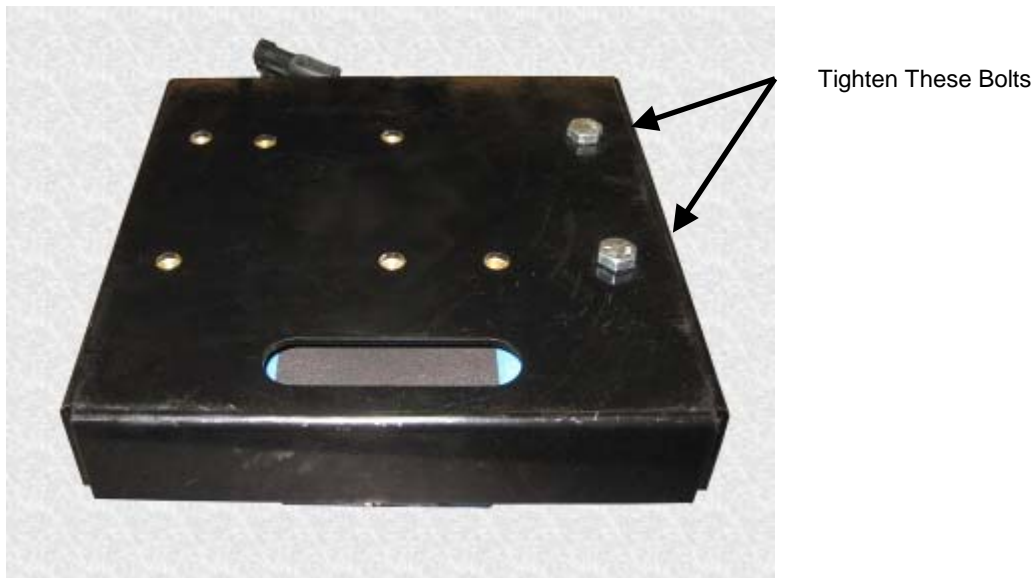
2. Attach the Steering Valve bracket to the top, left side of the Power Beyond bracket using two M10 x 40mm bolts, washers, and nuts. The bracket will point down as shown in Figure 2-19. Tighten the bolts with a 17mm wrench and 17mm socket and ratchet.

Figure 2-19 Steering Valve Bracket Mounted



3. Start two of the 5/16” bolts for mounting the Steering Valve to the valve block as shown in Figure 2-20.

Figure 2-20 Prepare Bolts on Valve for Mounting



Note: Tightened the two bolts on the right to hold the cover firmly on the valve block while installing. Prior to tightening the bolts, verify the cover is centered so that the other holes on the cover will allow a bolt to screw in easily.

4. Attach the Steering Valve to the Steering Valve Bracket with the four 5/16" x 3/4" bolts as shown in Figure 2-21.

Figure 2-21 Steering Valve Mounted



5. Tighten the four bolts using a 1/2" ratchet wrench. The Steering Valve is now installed

Large Frame Models

1. Locate the top of the metal bracket holding the Power Beyond ports on the back of the vehicle as shown in Figure 2-22.

Figure 2-22 Steering Valve Mounting Location

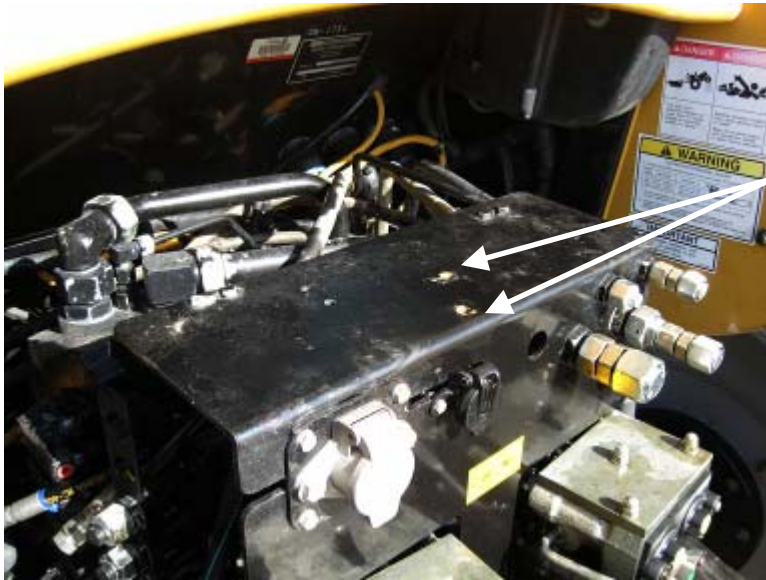


Steering Valve
Mounting Point

Three-Point Linkage
Arm Bracket

2. Remove the three-point linkage arm bracket shown in Figure 2-22 from the top of the Power Beyond bracket by removing the two bolts with a 13mm socket and ratchet. Figure 2-23 shows the bracket removed.

Figure 2-23 Three Point Linkage Arm Bracket Removed



Three-Point Linkage
Arm Bracket Bolt
Holes

3. Place the Steering Valve bracket to the top of the Power Beyond bracket over the holes that remain after the three-point linkage arm bracket is removed.
4. Place the three-point linkage arm bracket on top of the Steering Valve bracket. Secure both the three-point linkage arm bracket and Steering Valve to the Power Beyond bracket with the previously removed bolts. Tighten the bolts with a 13mm socket and ratchet. Figure 2-24 shows the Steering Valve bracket attached.

Figure 2-24 Steering Valve Bracket Mounted



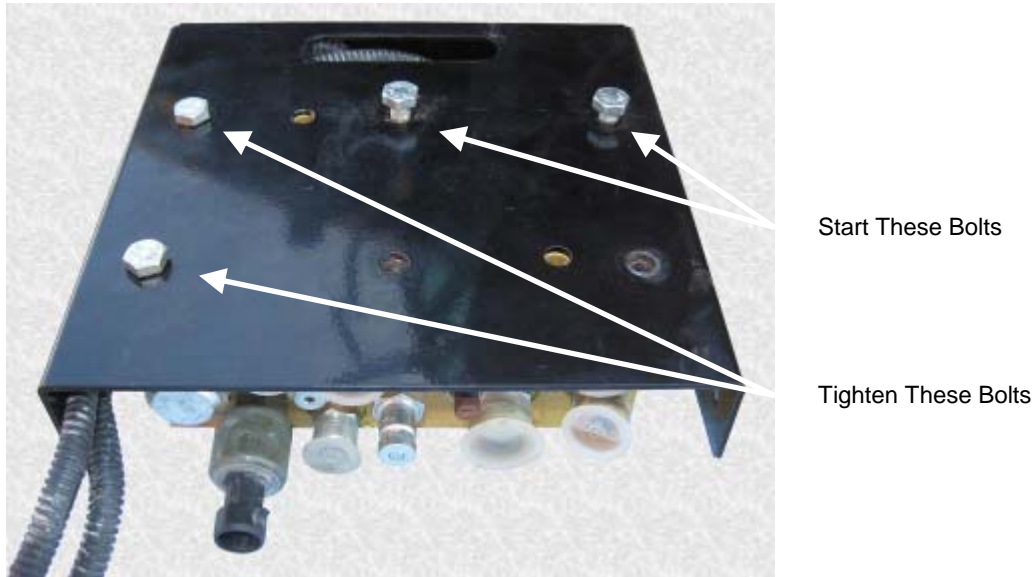
Mounting Slots for
Steering Valve

Mounting Bolts

Three-Point Linkage
Arm Bracket

5. Start two of the 5/16" bolts for mounting the Steering Valve to the valve block as shown in Figure 2-25. Allow enough space for the bolt heads to slide into the slots on the mounting bracket shown in Figure 2-24.

Figure 2-25 Prepare Bolts on Valve for Mounting



Note: Tightened the two bolts on the left to hold the cover firmly on the valve block while installing. Prior to tightening the bolts, verify the cover is centered so that the other holes on the cover will allow a bolt to screw in easily.

6. Slide the Steering Valve into the mounted position as shown in Figure 2-26.

Figure 2-26 Steering Valve Mounted



7. Secure the Steering Valve to the bracket with the other two 5/16" bolts.
8. Tighten the four bolts using a 1/2" ratchet wrench. The Steering Valve is now installed

Hydraulic Hose Overviews

Steering Valve Port Overview

The Steering Valve has six ports that need to be connected to the vehicle. The ports are shown in Figure 2-27 and the connection for each is described in Table 2-2.

Figure 2-27 Steering Valve Ports

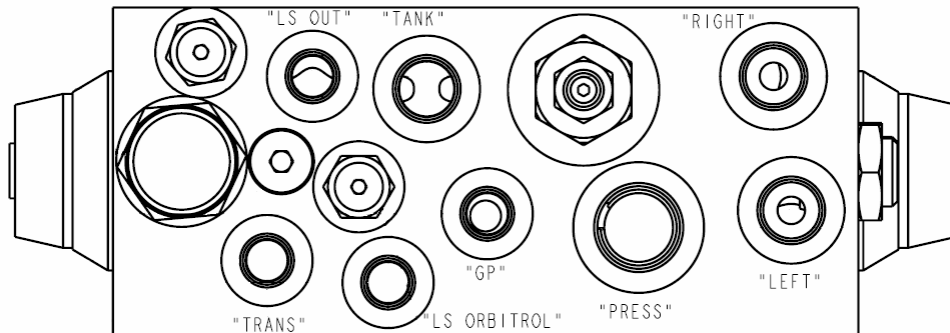


Table 2-2 Valve Functions and Fitting Sizes

Valve Label	Function	Fitting Type/Size
PRESS	Pressure (From Power Beyond)	-8 ORFS
TANK	Return (From Power Beyond)	-6 ORFS
LS ORBITROL	Load Sense From Orbitrol Line	-4 ORFS
LS OUT	Load Sense (From Power Beyond)	-4 ORFS
LEFT	Left Steering Cylinder	-6 ORFS
RIGHT	Right Steering Cylinder	-6 ORFS
GP	Diagnostics Port	1/8" Coupler Nipple (SAE J1502)
TRANS	Pressure Transducer	-4 SAE ORB

Hose Connection Overview

Figure 2-28 and Figure 2-29 show overviews of how the hose connections are to be attached. The PRESS, TANK, and LS OUT ports will be connected to the Power Beyond connections. The LS ORBITROL port will be connected to the Load Sense line that detects when the Orbitrol is enabled. The LEFT and RIGHT ports will be teed into the corresponding lines near the orbitrol or the steering cylinders that cause the vehicle to turn left or right.

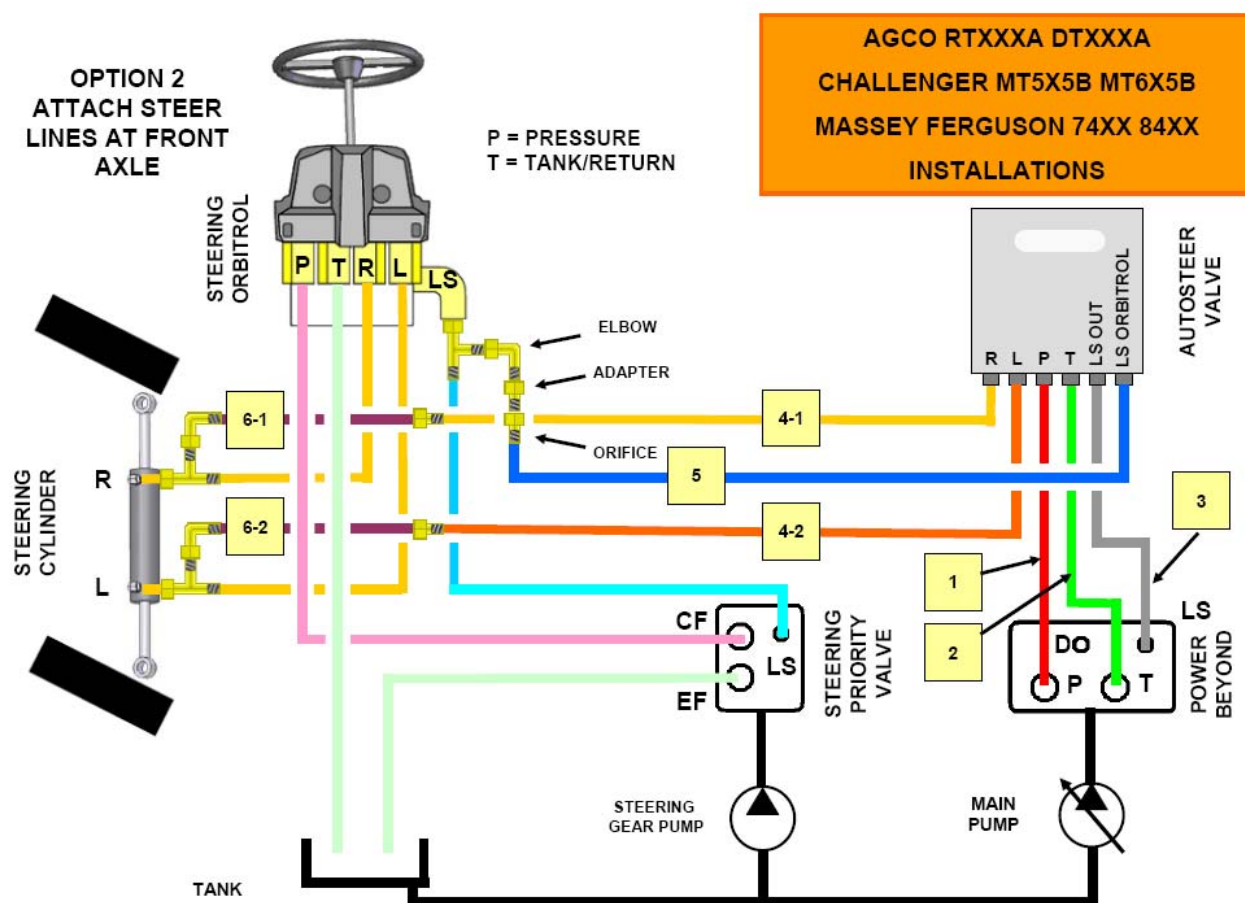
Figure 2-28 shows an overview of the hose connections when the system is teed into the steer lines at the Orbitrol. Figure 2-29 shows an overview of the hose connections when the system is teed into the steer lines at the front axle. Table 2-3 shows the list of hoses provided by the installation kit. The kit also provides colored cable ties. To ensure the correct hose is attached to the correct port on both sides, attach the colored cable tie shown in the table to each end of the hose listed.

The numbers in Figure 2-28, Figure 2-29, and Table 2-3 correspond to the Item Numbers for each hose provided in Table 1-3 on page 5. If the number has a "- #" after it, it means that there are multiple hoses with the same length and fittings.



Valve Port Hose	Color	Item Number	Notes
PRESSURE	Red	1	Hose, 3/8" x 20" -8F ORFS x -12LFM 90
TANK	Green	2	Hose, 3/8" x 20" -6F ORFS x 12L FM 90
LS ORIBITROL	Blue	5	Hose, 1/4" x 110" -4F ORFS x -4F ORFS
LS OUT	Grey	3	Hose, 1/4" x 20" -4F ORFS x 8L FM 90
RIGHT	Yellow	4-1	Hose, 3/8" x 110" -6 ORFS x -12L FM
LEFT	Orange	4-2	Hose, 3/8" x 110" -6 ORFS x -12L FM
EXTENTION RIGHT	Yellow	6-1	Hose, 3/8" x 70" 12L FM x 12L M
EXTENTION LEFT	Orange	6-2	Hose, 3/8" x 70" 12L FM x 12L M

Figure 2-29 Hose Connections Overview when Connecting Near the Steering Axle



Hydraulic Hose Connection Procedure

Note: Due to limited space in the Steering Valve port area, the hoses should be connected in the order provided by this installation manual to reduce installation problems. Refer to the hose diagrams in Figure 2-28 and Figure 2-29 and Table 2-3 for information on connecting the correct hydraulic hose to the correct ports on the vehicle and Steering Valve.

The Power Beyond connections for the small frame and large frame vehicles are slightly different. Follow the instructions for the vehicle type the system is being installed on.

The small frame models also have more than one type of Load Sense Orbitrol connection. The Option 1 installation has the Orbitrol Load Sense hose connected to the steering Orbitrol with a 90 Deg fitting. The Option 2 installation has the Orbitrol Load Sense hose connected to the steering Orbitrol with a straight connection. The procedure for connecting to this line is slightly different. Check the Orbitrol connection on the vehicle the system is being installed on and follow the procedure for that installation. Large frame models will use the Option 2 installation.

The steering lines can either be teed in at the steering Orbitrol (Option 1) or they can be teed in near the steering cylinders (Option 2). Use the option that makes the installation easier.

Small Frame Power Beyond Connections

1. Locate the Power Beyond ports on the rear of the vehicle. See Figure 2-30.

Figure 2-30 Power Beyond Ports



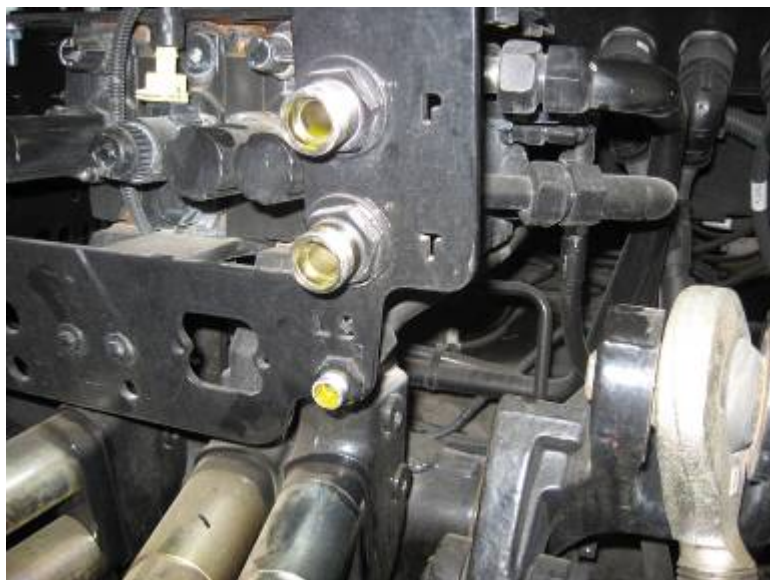
Note: On some vehicles the Load Sense and Return lines have a fitting that joins the two ports together. If this fitting is present, remove it from the vehicle and store it in a safe place in case it is required in the future.

Remove the cap from the Load Sense line with a 19mm wrench. Remove the caps from the Pressure and Return lines with a 32mm or 1-1/4" wrench. See **Note:** Ensure there is an oil catch container prepared to collect oil before the caps are removed to prevent oil spills.

2. Figure 2-31.

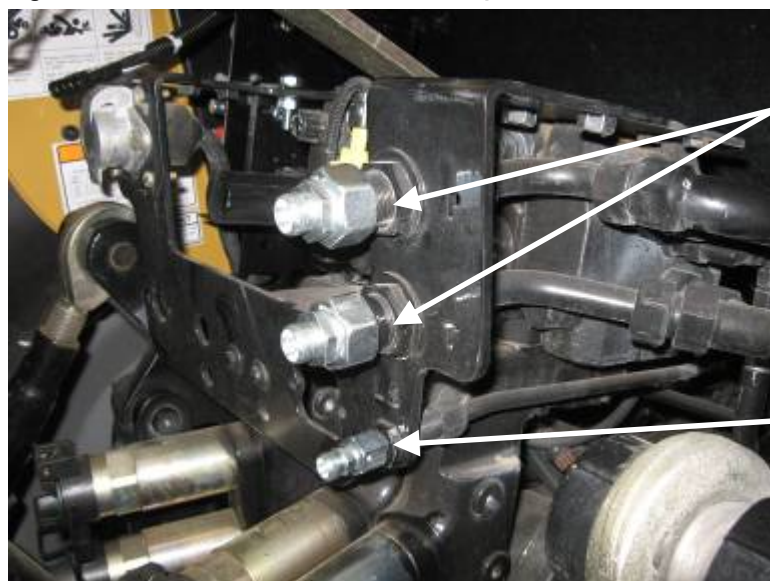
Note: Ensure there is an oil catch container prepared to collect oil before the caps are removed to prevent oil spills.

Figure 2-31 Caps Removed from Power Beyond Ports



3. Attach a 10L to 8L Reducer to the Load Sense port and an 18L to 12L Reducer to the Pressure and Return ports. Tighten the Load Sense Reducer with a 19mm wrench. Tighten the Pressure and Return Reducers with a 32mm or 1-1/4" wrench. See Figure 2-32.

Figure 2-32 Attach Reducers to Power Beyond Ports

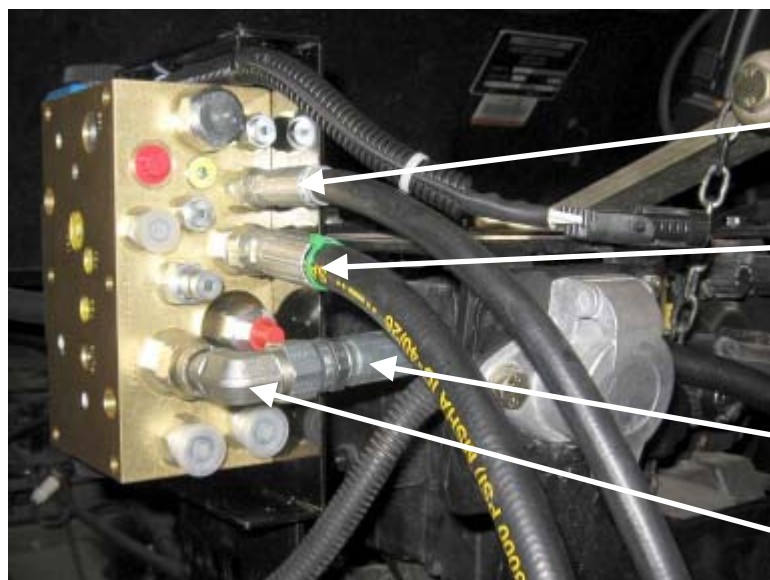


18L to 12L Reducer

10L to 8L Reducer

4. Connect the Load Sense hose to the **LS OUT** port on the Steering Valve. Leave connection loose for now.
5. Connect the Return hose to the **TANK** port on the Steering Valve. Leave connection loose for now.
6. Connect a -8 90 Deg. Elbow to the **PRESS** port on the Steering Valve. Point the elbow to the right.
7. Attach the Pressure hose to the -8 90 Deg. Elbow. Leave connections loose for now. See Figure 2-33 for the final assembly.

Figure 2-33 Power Beyond Hoses Connected to Steering Valve



Load Sense Hose

Return/Tank Hose

Pressure Hose

-8 90 Deg. Elbow

8. Connect the 90 degree end of the Load Sense hose to the Load Sense port. Tighten the hose with 14mm and 19mm wrenches
9. Connect the 90 degree end of the Return hose to the Return port. Tighten the hose with 22mm and 24mm wrenches.
10. Connect the 90 degree end of the Pressure hose to the Pressure port. Tighten the hose with 22mm and 24mm wrench. See Figure 2-34 for a picture of the final assembly.

Figure 2-34 Power Beyond Hoses Connected to the Power Beyond



11. Tighten the Load Sense connection on the Steering Valve with an 11/16" stubby wrench.
12. Tighten the Return hose connection on the Steering Valve with a 13/16" stubby wrench
13. Tighten the -8 90 Deg. Elbow and Pressure hose connections on the Steering Valve with a 15/16" stubby wrench.

Large Frame Power Beyond Connections

1. Locate the Power Beyond ports on the rear of the vehicle. See Figure 2-35.

Figure 2-35 Power Beyond Ports



Note: On some vehicles the Load Sense and Drain lines have a fitting that joins the two ports together. If this fitting is present, remove it from the vehicle and store it in a safe place in case it is required in the future. When this fitting is removed, the Drain port is now exposed. Attach a 12L cap provided with the kit to the port and tighten it with a 22mm wrench.

Remove the cap from the Load Sense line with a 19mm or wrench. Remove the caps from the Pressure and Return lines with a 32mm or 1-1/4" wrench. See **Note:** Ensure there is an oil catch container prepared to collect oil before the caps are removed to prevent oil spills.

2. Figure 2-36.

Note: Ensure there is an oil catch container prepared to collect oil before the caps are removed to prevent oil spills.

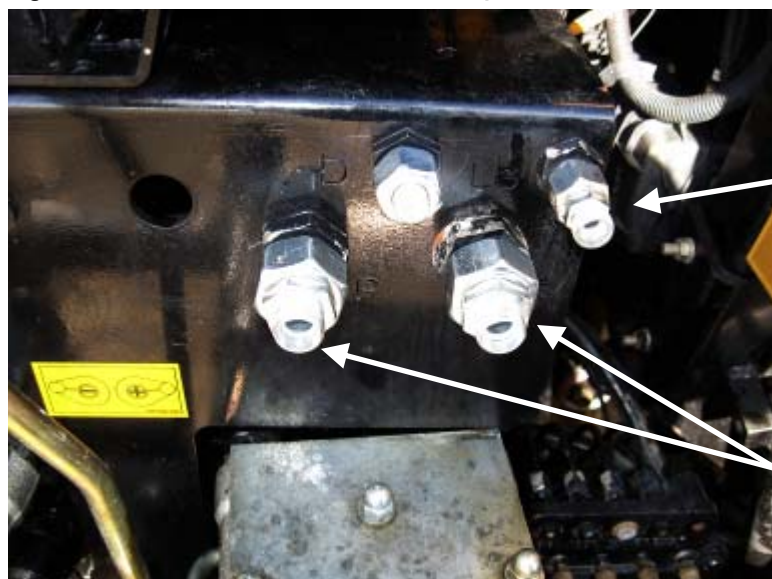
Figure 2-36 Caps Removed from Power Beyond Ports



12L Cap

3. Attach a 10L to 8L Reducer to the Load Sense port and an 18L to 12L Reducer to the Pressure and Return ports. Tighten the Load Sense Reducer with a 19mm wrench. Tighten the Pressure and Return Reducers with a 1-1/4" or 32mm wrench. See Figure 2-37.

Figure 2-37 Attach Reducers to Power Beyond Ports

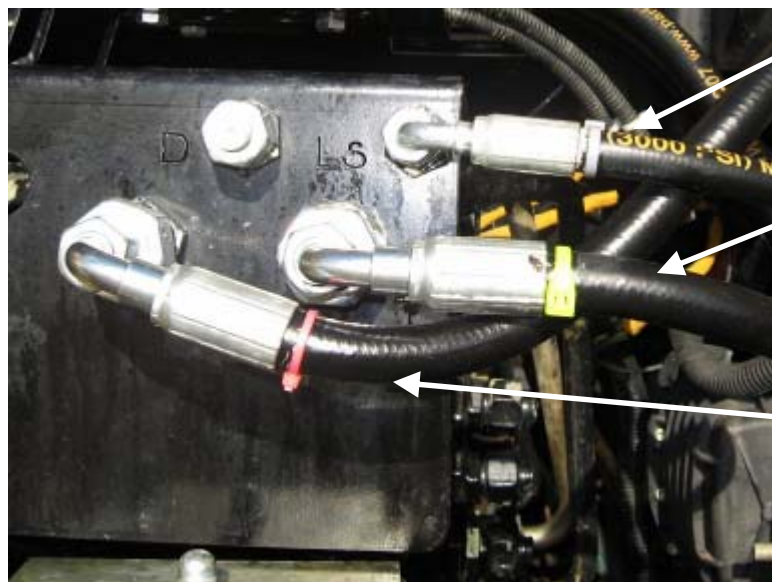


10L to 8L Reducer

18L to 12L Reducer

4. Connect the 90 degree end of the Load Sense hose to the Load Sense port. Point the hose to the right and tighten the hose with 14mm and 19mm wrenches
5. Connect the 90 degree end of the Return hose to the Return port. Point the hose to the right and tighten the hose with 22mm and 24mm wrenches.
6. Connect the 90 degree end of the Pressure hose to the Pressure port. Point the hose to the right and tighten the hose with 22mm and 24mm wrenches. See Figure 2-38 for the final assembly.

Figure 2-38 Power Beyond Hoses Connected



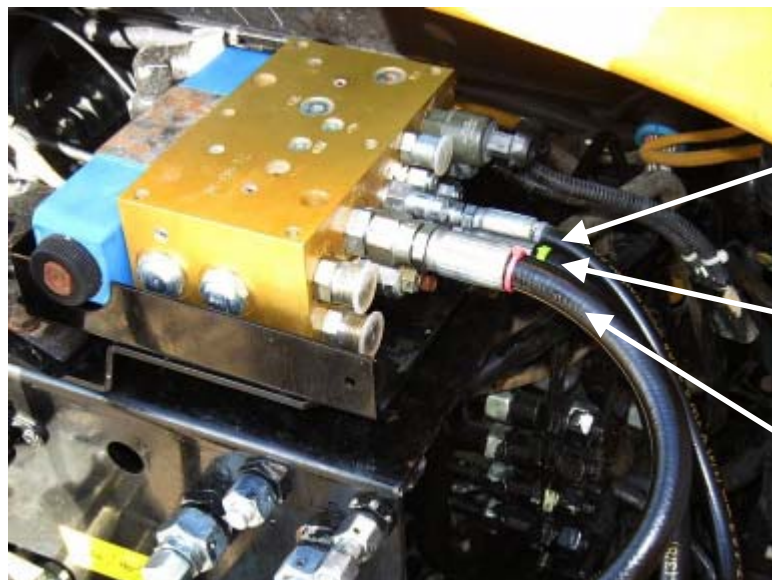
Load Sense Hose

Return/Tank Hose

Pressure Hose

7. Connect the Load Sense hose to the **LS OUT** port on the Steering Valve. Tighten the connection with an 11/16" wrench.
8. Connect the Return hose to the **TANK** port on the Steering Valve. Tighten the connection with a 13/16" wrench.
9. Connect the Pressure hose to the **PRESS** port on the Steering Valve. Tighten the connection with a 15/16" wrench. See Figure 2-39 for a picture of the final assembly.

Figure 2-39 Power Beyond Hoses Connected to Steering Valve



LS OUT Port

TANK Port

PRESS Port

Open Small Frame Vehicle Hood

1. Locate the hood release button at the front, left corner of the hood shown in Figure 2-40. Press the button and lift the hood up

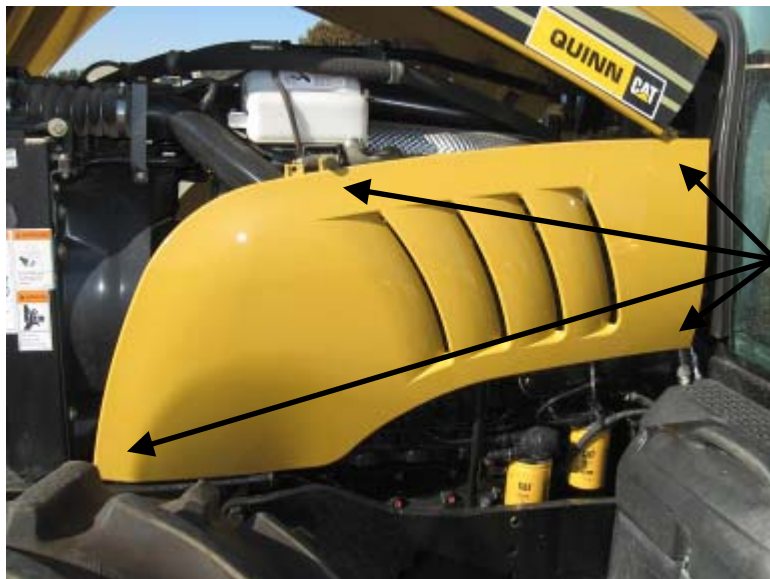
Figure 2-40 Hood Release Button



Front Latch
Button

2. Pull the engine side panels off the vehicle. It is held in place by clips on all four corners shown in Figure 2-41.

Figure 2-41 Remove Side Panels



Pull Out to
Remove

3. Figure 2-42 shows the hood in the completely open position.

Figure 2-42 Hood Opened



Steering Orbitrol
Location

Open Large Frame Vehicle Hood

4. There are two buttons that allow the hood to swing up and then forward. The general locations on the vehicle are shown in Figure 2-43.

Figure 2-43 Hood Latch General Locations



Rear Latch
Point Button

Front Latch
Point Button

5. To open the hood, first press the button on the front, left side of the hood shown in Figure 2-44 and then raise the front of the hood all the way open.

Figure 2-44 Front Hood Latch Button



6. Once the hood has been raised, a second button at the left, rear side of the engine compartment will become visible shown in Figure 2-45. Press this button to release the rear of the hood and swing it up and forward to gain access to the Orbitrol area.

Figure 2-45 Rear Hood Latch Button



Rear Latch
Point Button

7. Figure 2-46 shows the hood in the completely open position.

Figure 2-46 Hood Opened



LS Orbitrol Connections (Option 1)

1. Locate the bolt holding the plastic molding to the front of the cab shown in Figure 2-47. Remove the bolt with a 13mm socket and ratchet. Be prepared to catch the spacer that will fall out when the bolt is removed shown in Figure 2-48.

Figure 2-47 Remove Bolt Holding Plastic Molding



Remove Bolt

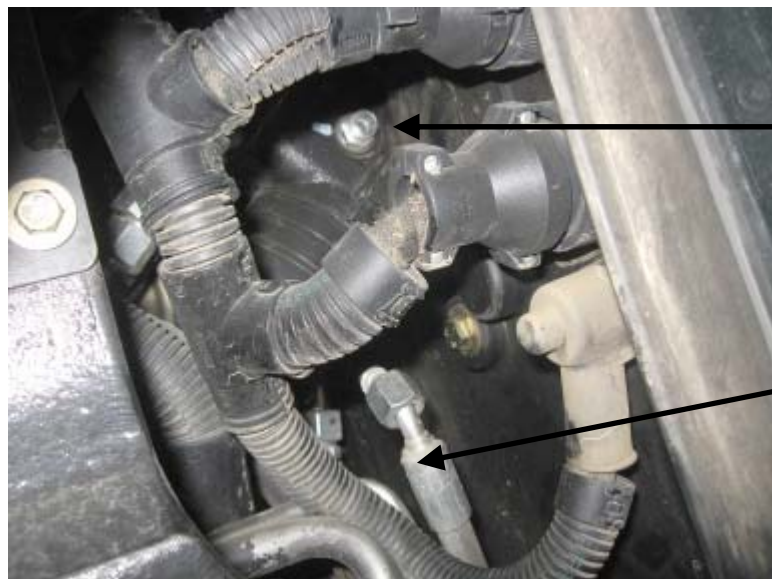
Figure 2-48 Catch Spacer When Bolt is Removed



Catch Spacer

2. Locate the Orbitrol Load Sense line connected to the Orbitrol by a 90 Deg connector on the end of the hose on the left side of the Orbitrol. Disconnect the line from the port with a 17mm stubby wrench as shown in Figure 2-49.

Figure 2-49 Orbitrol Load Sense Line

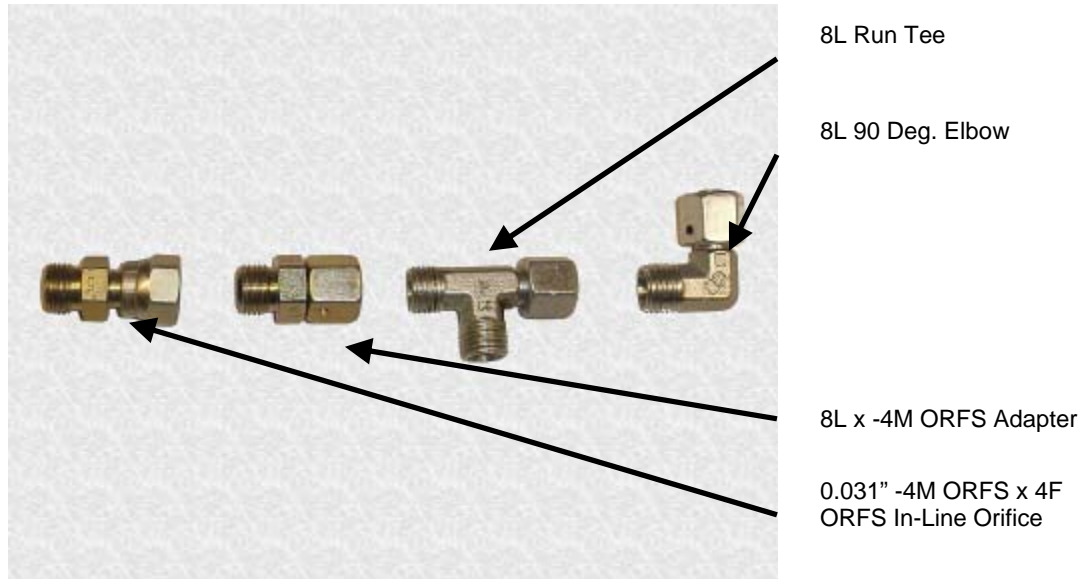


Orbitrol Load Sense Port

Load Sense Line

3. Attach the 8L Run Tee to the 8L 90 Deg. Elbow. Leave this connection loose for now.
4. Attach the 8L x -4M ORFS Adapter to the straight through port of the 8L Run Tee. Tighten the connection with 17mm and 12mm wrenches.
5. Attach the 0.031" -4M ORFS x 4F ORFS In-Line Orifice to the 8L x -4M ORFS Adapter. Tighten the connection with 17mm and 11/16" wrenches. See Figure 2-50 for an example of how the above parts are to be assembled.

Figure 2-50 LS Orbitrol Adapter Fittings



6. Attach the 8L 90 Deg. Elbow of the adapter assembly to the Load Sense port on the steering Orbitrol. Tighten the connection with a 17mm stubby wrench with the Tee pointing to the right and forward side of the vehicle.
7. Attach the LS Orbitrol hose to the 8L x -4M ORFS Adapter. Tighten the hose connection with 5/8" and 11/16" wrenches.
8. Attach the original Orbitrol Load Sense hose to the other port of the 8L Run Tee. Tighten the connection with a 17mm stubby wrench. Verify that all the fittings in the adapter assembly are now tight. See Figure 2-51 for an example of the final assembly.

Figure 2-51 LS Orbitrol Hose Connected to Load Sense Port on Orbitrol



9. Route the LS Orbitrol hose under the cab along the left side of the vehicle to the rear of the machine where the Steering Valve is located.
10. Attach the hose to the **LS ORBITROL** port on the Steering Valve and tighten with an 11/16" stubby wrench. See Figure 2-52.

Figure 2-52 LS ORBITROL Port Connected



LS ORBITROL Port

LS Orbitrol Connections (Option 2)

1. Locate the steering Orbitrol at the top, rear part of the engine compartment right ahead of the cab as shown in Figure 2-53.

Figure 2-53 Steering Orbitrol



Steering Orbitrol
Location

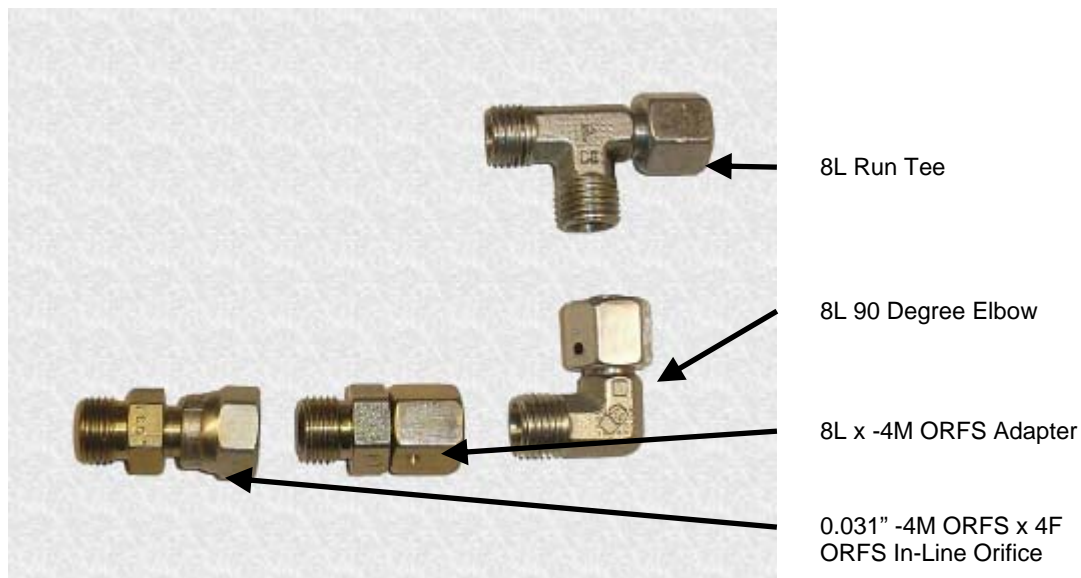
2. Locate the Load Sense port on the on the left side of the Orbitrol shown in Figure 2-54. Disconnect the line from the port with a 17mm stubby wrench.

Figure 2-54 Load Sense Port on Orbitrol



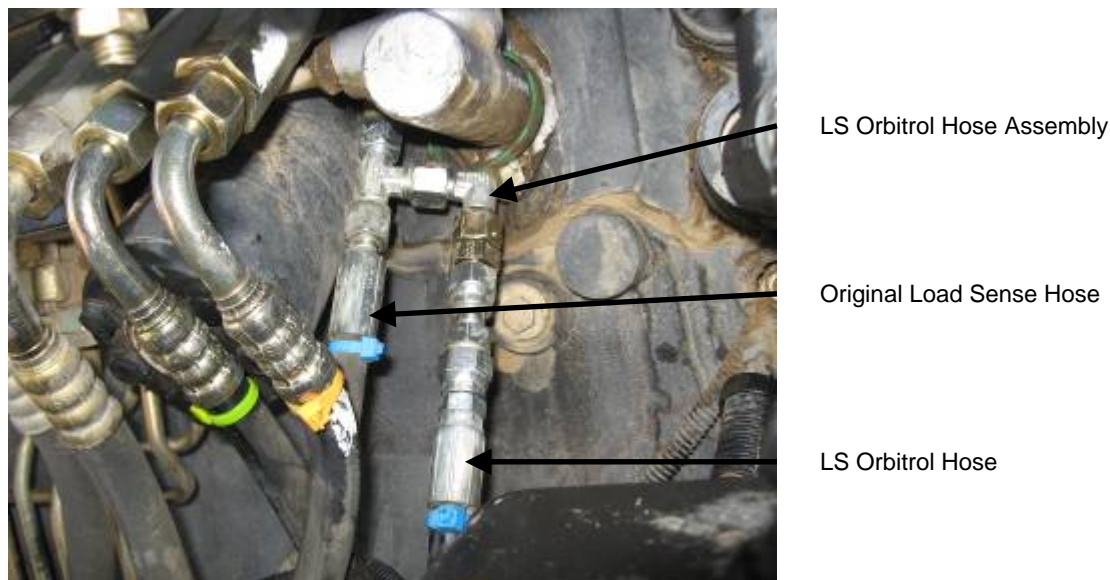
3. Use colored cable ties to mark the existing Left, Right, and Load Sense lines identified in Figure 2-54.
4. Attach the 8L x -4M ORFS Adapter to the 0.031" -4M ORFS x 4F ORFS In-Line Orifice. Tighten the connection with 11/16" and 17mm wrenches.
5. Attach the 8L 90 Degree Elbow to the 8L x -4M ORFS Adapter. Tighten the connection with 17mm and 12mm wrenches.
6. Attach the 8L Run Tee to the 8L 90 Degree Elbow. Leave loose for the time being. See Figure 2-55 for an example of how the above parts are to be assembled.

Figure 2-55 LS Orbitrol Adapter Fittings



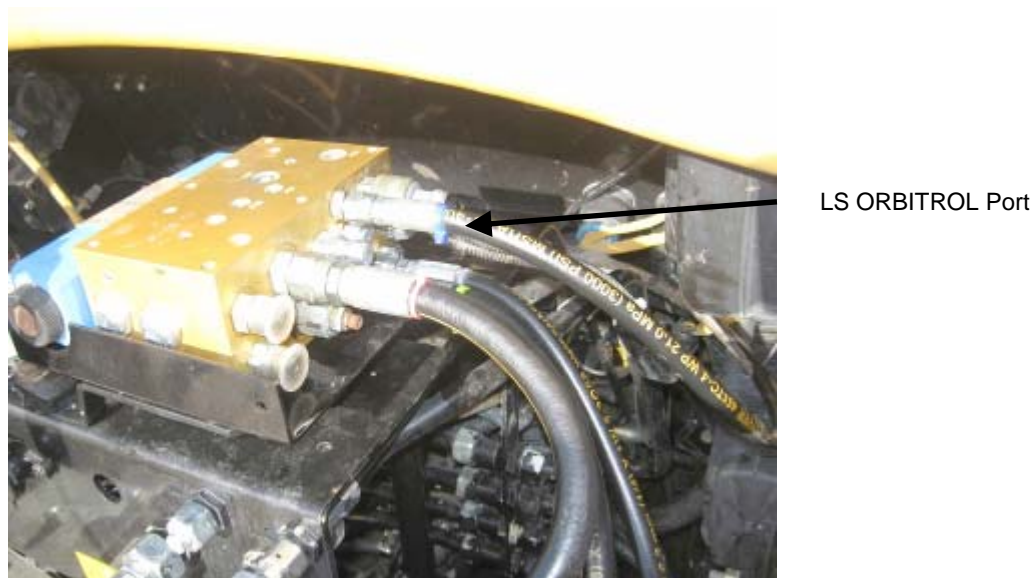
7. Attach the 8L Run Tee of the adapter assembly to the Load Sense port on the steering Orbitrol. Tighten the connection with a 17mm stubby wrench with the Tee pointing to the right side of the vehicle.
8. Attach the original Load Sense hose to the other port of the 8L Run Tee. Tighten the connection with a 17mm stubby wrench.
9. Attach the LS Orbitrol hose to the 0.031" -4M ORFS x 4F ORFS In-Line Orifice. Tighten the connection with 11/16" and 5/8" wrenches. See Figure 2-56 for an example of the final assembly.

Figure 2-56 LS Orbitrol Hose Connected to Load Sense Port on Orbitrol



10. Route the LS Orbitrol hose under the cab along the left side of the vehicle to the rear of the machine where the Steering Valve is located.
11. Attach the hose to the **LS ORBITROL** port on the Steering Valve and tighten with an 11/16" wrench. Figure 2-52 shows the connection on a small frame install. Figure 2-57 shows the connection on a large frame install.

Figure 2-57 LS ORBITROL Port Connected

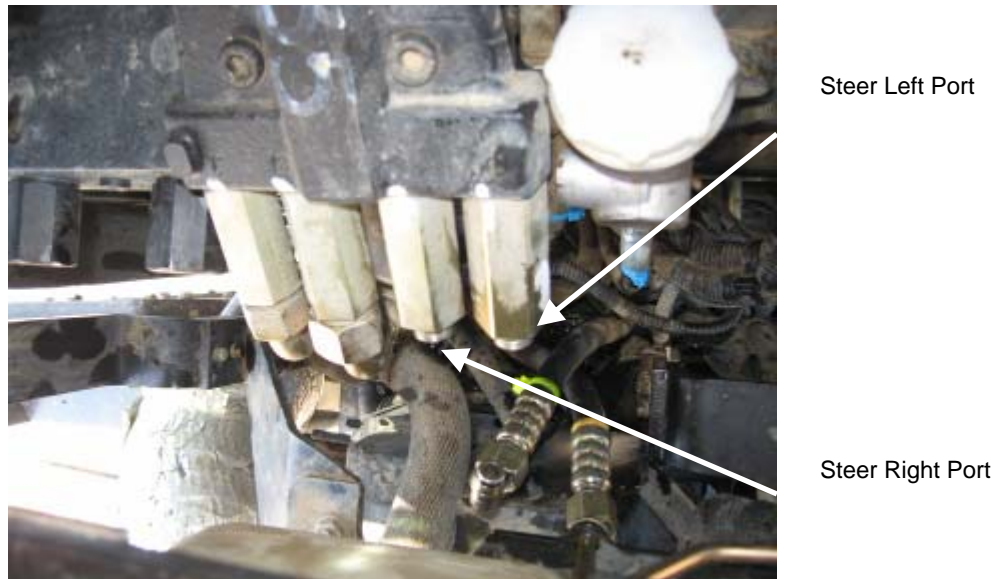


Steering Line Hose Connections at Orbitrol (Option 1)

1. Disconnect the Left and Right Steer lines from the Orbitrol with a 22mm stubby wrench as shown in Figure 2-58.

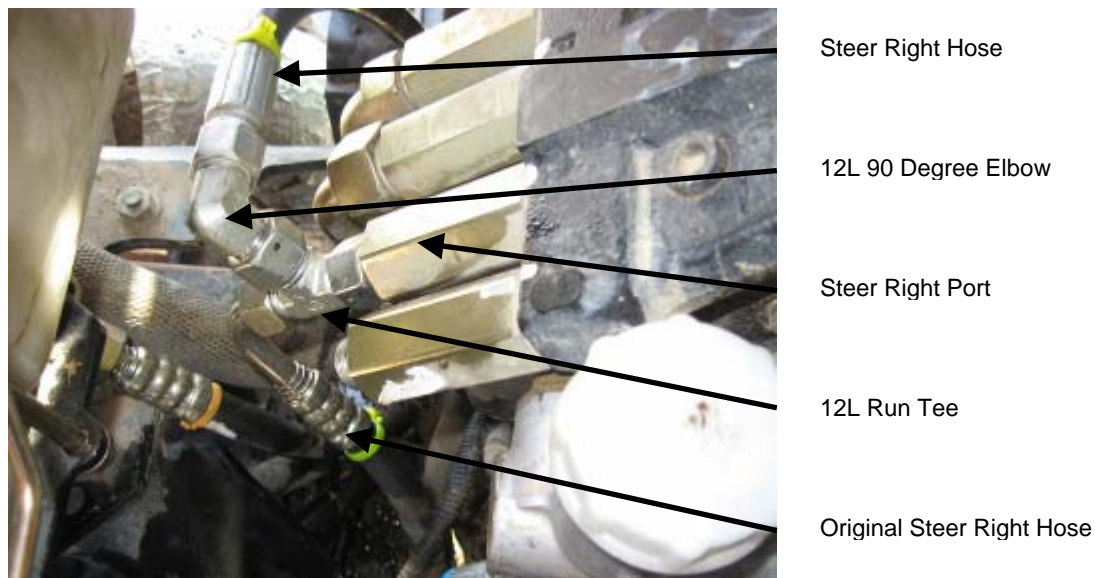
Note: The hose connections for the small and large frame are very similar in this section. The Figures will show examples of the connections being made on a large frame vehicle. Follow the same procedure for small frame vehicles.

Figure 2-58 Left and Right Steer Lines Disconnected



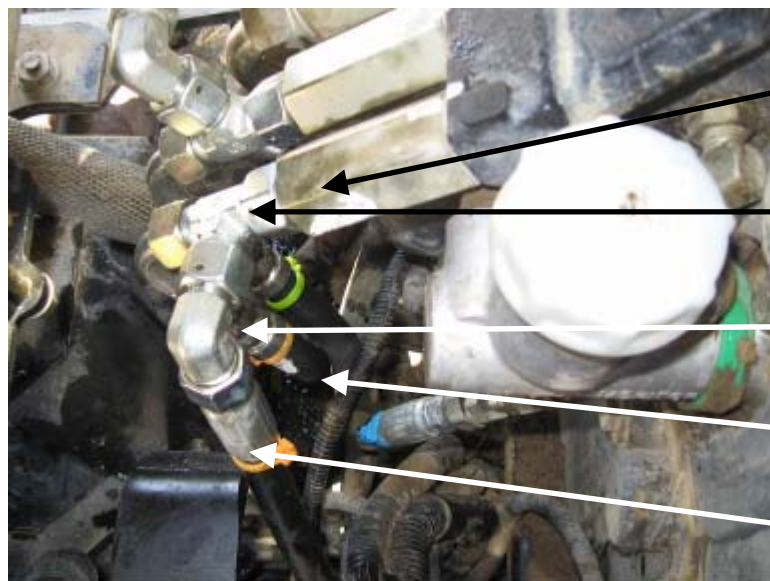
2. Attach a 12L Run Tee to the Steer Right port of the Orbitrol
3. Attach the original Steer Right hose to the end of the 12L Run Tee.
4. Attach a 12L 90 Degree Elbow to the tee port of the 12L Run Tee and point it upwards.
5. Attach the Steer Right hose to the 12L 90 Degree Elbow. Tighten all connections with a 22mm stubby wrench. See Figure 2-59 for an example of all of these connections.

Figure 2-59 Steer Right Lines Connected



6. Attach a 12L Run Tee to the Steer Left port of the Orbitrol
7. Attach the original Steer Left hose to the end of the 12L Run Tee.
8. Attach a 12L 90 Degree Elbow to the tee port of the 12L Run Tee and point it to the left side of the vehicle.
9. Attach the Steer Left hose to the 12L 90 Degree Elbow. Tighten all connections with a 22mm stubby wrench. See Figure 2-60 for an example of all of these connections.

Figure 2-60 Steer Left Lines Connected



- Steer Left Port
- 12L Run Tee
- 12L 90 Degree Elbow
- Original Steer Left Hose
- Steer Left Hose

10. Run the Steer Right hose down the right side of the engine compartment and then under the cab on the right side of the vehicle back to the Steering Valve.
11. Run the Steer Left hose down the left side of the engine compartment and then under the cab on the left side of the vehicle back to the Steering Valve.
12. Attach the Steer Right hose to the **RIGHT** port on the Steering Valve and tighten with a 13/16" wrench.
13. Attach the Steer Left hose to the **LEFT** port on the Steering Valve and tighten with a 13/16" wrench. Figure 2-61 shows the connections to a large frame model. Figure 2-67 shown the connections to a small frame model

Figure 2-61 Connect RIGHT and LEFT Ports on Steering Valve



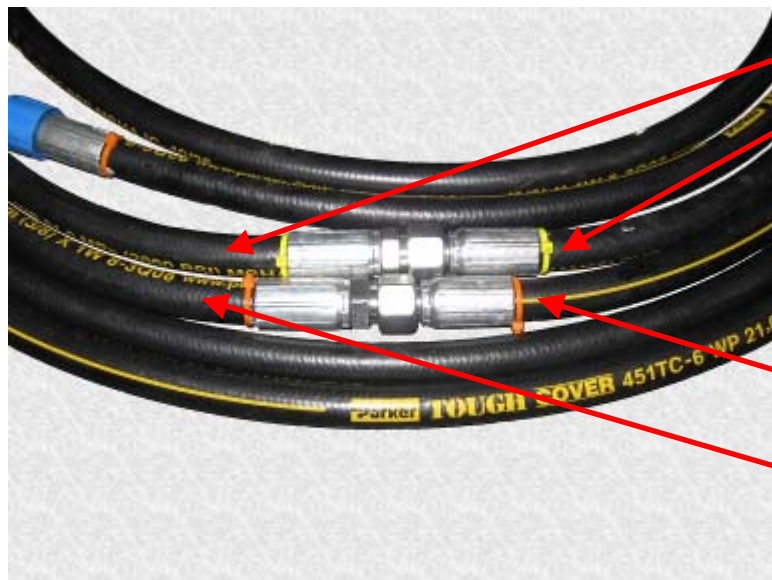
- LEFT Port
- RIGHT Port

Steering Line Hose Connections at Front Axle (Option 2)

Note: The small and large frame vehicles come with different versions of front axles. These vehicles also have a variety of options available that connect to the front axle. Due to this variability, the Figures provided with this installation procedure may not match with what is seen on the installation. However, the procedure remains the same in all situations.

1. Connect the extension hose to the Steer Right and Steer Left hoses as shown in Figure 2-62 and tighten connections with 19mm and 22mm wrenches.

Figure 2-62 Connect Extensions to Steer Hoses



Right Hose

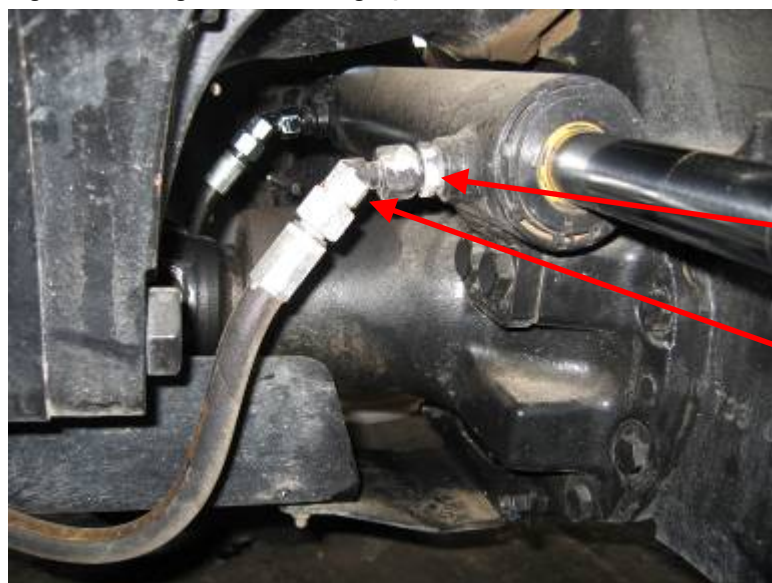
Right Extension Hose

Left Extension Hose

Left Hose

2. Locate the steering line hose connection at the steering cylinder on the right side of the vehicle shown in Figure 2-63.

Figure 2-63 Right Side Steering Cylinder Connection

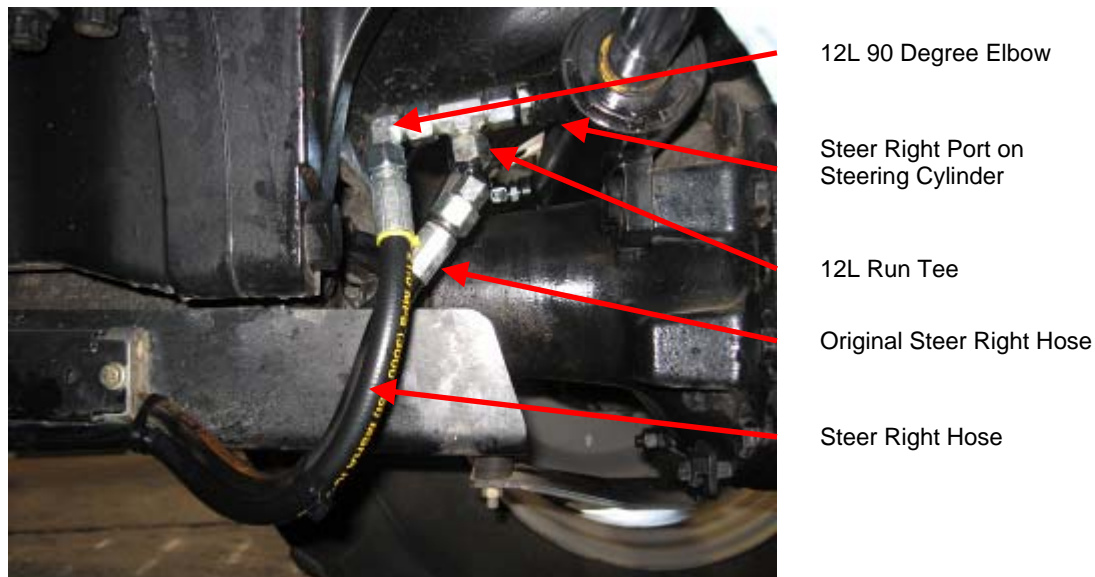


Steer Right Port on
Steering Cylinder

12L 45 Deg. Elbow

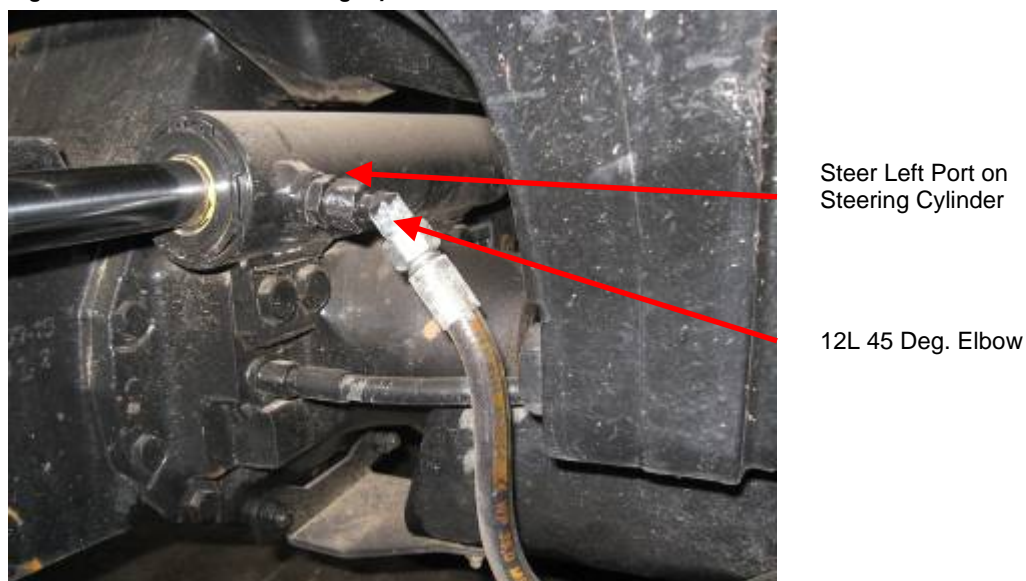
3. Loosen the connection on the existing 12L 45 Deg. Elbow fitting with 17mm and 22mm wrenches.
4. Disconnect the existing steering line from the steering cylinder with a 22mm wrench.
5. Attach a 12L Run Tee to the steering line on the steering cylinder with the tee pointing down.
6. Attach a 12L 90 Degree Elbow to the end of the 12L Run Tee and point it down.
7. Attach the original Steer Right hose to the tee port of the 12L Run Tee. Adjust the angle as needed.
8. Attach the Steer Right hose to the 12L 90 Degree Elbow. Tighten all connections with 17mm and 22mm wrenches. See Figure 2-64 for an example of all of these connections.

Figure 2-64 Right Steering Cylinder Port Connected



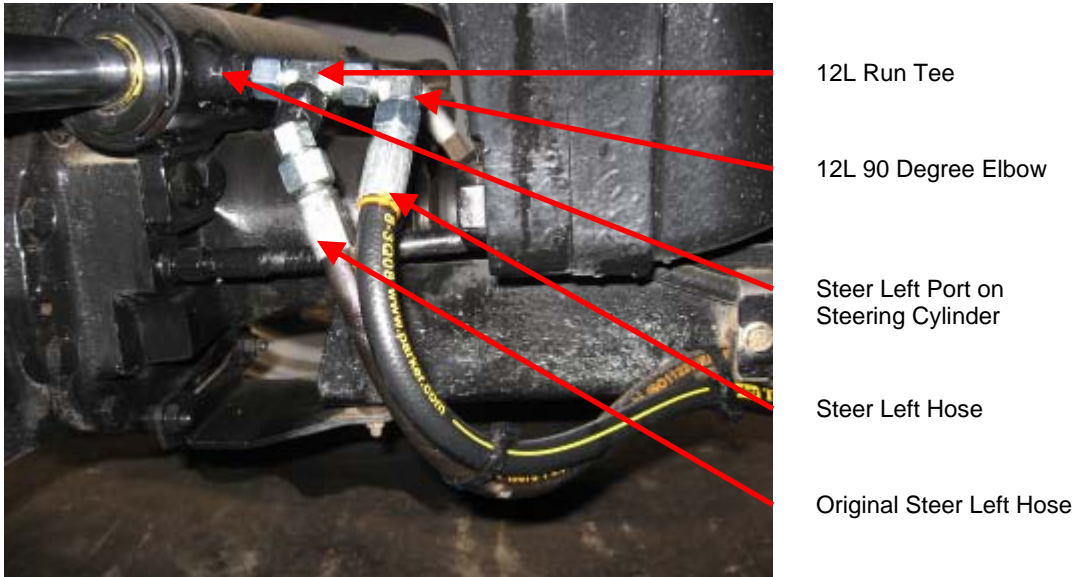
9. Locate the steering line hose connection at the steering cylinder on the left side of the vehicle shown in Figure 2-65.

Figure 2-65 Left Side Steering Cylinder Connection



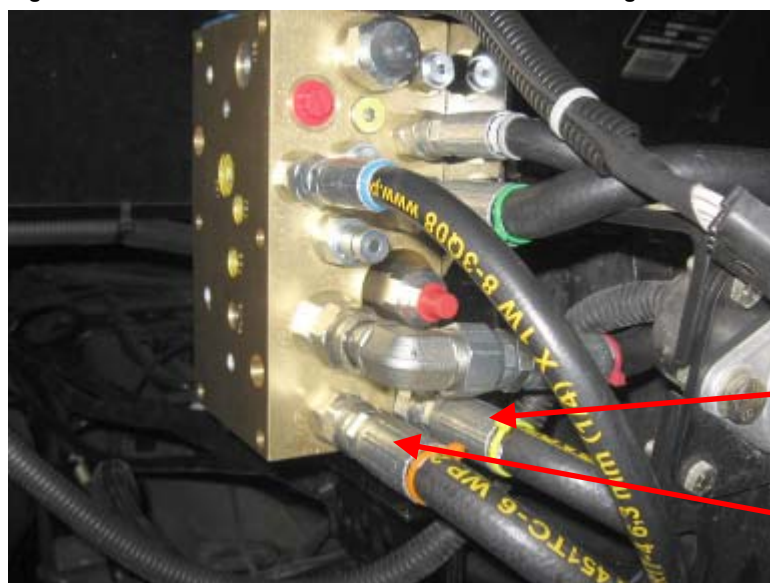
10. Loosen the connection on the existing 12L 45 Deg. Elbow fitting with 17mm and 22mm wrenches
11. Disconnect the existing steering line from the steering cylinder with a 22mm wrench.
12. Attach a 12L Run Tee to the steering line on the steering cylinder with the tee pointing down.
13. Attach a 12L 90 Degree Elbow to the end of the 12L Run Tee and point it down.
14. Attach the original Steer Left hose to the tee port of the 12L Run Tee. Adjust the angle as needed.
15. Attach the Steer Left hose to the 12L 90 Degree Elbow. Tighten all connections with 17mm and 22mm wrenches. See Figure 2-66 for an example of all of these connections.

Figure 2-66 Left Steering Cylinder Port Connected



16. Run the Steer Right hose along the existing steer line and then under the cab on the right side of the vehicle back to the Steering Valve.
17. Run the Steer Left hose along the existing steer line and then under the cab on the left side of the vehicle back to the Steering Valve.
18. Attach the Steer Right hose to the **RIGHT** port on the Steering Valve and tighten with a stubby 13/16" wrench.
19. Attach the Steer Left hose to the **LEFT** port on the Steering Valve and tighten with a stubby 13/16" wrench. Figure 2-61 shows the connections to a large frame model. Figure 2-67 shown the connections to a small frame model.

Figure 2-67 Connect RIGHT and LEFT Ports on Steering Valve



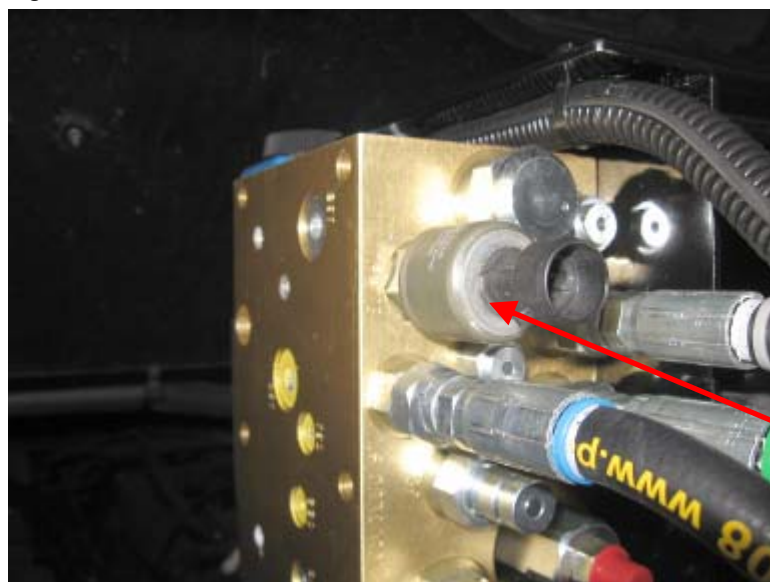
RIGHT Port

LEFT Port

Connect Pressure Transducer

1. If the Pressure Transducer was not installed originally, attach it now with a 3/4" stubby wrench as shown in Figure 2-68.

Figure 2-68 Attach Pressure Transducer



Pressure Transducer

2. Attach the Pressure Transducer Jumper Harness to the Pressure Transducer
3. Coil the excess harness in between the valve and the outer cover and secure with a cable tie.
4. Cable tie the 4-pin and 10-pin connector together. Figure 2-69 shows the connection on a small frame installation. Figure 2-70 shows the connections on a large frame installation.

Figure 2-69 Pressure Transducer Harness Connected on Small Frame



Figure 2-70 Pressure Transducer Harness Connected on Large Frame



5. Pressure Relief Valve Adjustment

The Steering Valve has a built-in load sense pressure relief valve that limits the maximum pump pressure when AutoSteering. The pressure relief valve must be adjusted after the entire AutoSteer system has been installed and the system has been checked for hydraulic leaks. The Display, Roof Module, and all harnesses must be connected prior to performing this procedure.

This procedure is provided in the **Final Hardware Installation Checklist** chapter after the rest of the installation has been completed. Do not forget to set this valve or system damage could occur.

Steering Valve Installation Checklist

1. Valve Bracket “U” bolts are tight.
2. Mounting bolts that secure the Steering Valve are tight.
3. Pressure Hose is connected to the correct port on the Steering Valve and Power Beyond Pressure port.
4. Tank Hose is connected to the correct port on Steering Valve and Power Beyond Return port.
5. LS-OUT Hose is connected to the correct port on Steering Valve and the Power Beyond Load Sense port.
6. LS ORBITROL Hose is connected to the correct ports on the Steering Valve and the Orbitrol Load Sense port.
7. Right Steer Hose is connected to the correct port on the Steering Valve and teed into the Steer Right line at the front axle.
8. Left Steer Hose is connected to the correct port on the Steering Valve and teed into the Steer Left line at the front axle.
9. Pressure Transducer has been installed and tightened.
10. All other hose fittings are tight.
11. Checked that all hose and cables have been routed so they will not be damaged by moving parts or foreign objects.
12. After the entire system has been installed, follow the Hydraulic Leak Test procedure in *Post-Installation Procedures and Information* chapter

Wheel Angle Sensor Installation (Optional)

The **Wheel Angle Sensor Installation** chapter information is provided in the following section:

- *Wheel Angle Sensor Overview*
- *Identifying the Front Axles*
- *Wheel Angle Sensor Installation Procedure*
 - *Mount Option 1 Brackets on Axle Type 1*
 - *Mount Option 1 Brackets on Axle Type 2 and 3*
 - *Mount Option 2 Brackets on Axle Type 2 and 3*
 - *Cut the Wheel Angle Sensor Rods to Length*
 - *Assemble the Linkage Rod Hardware*
 - *Attach Wheel Angle Sensor Rods to Brackets and Adjust*

Note: The Wheel Angle Sensor is optional equipment and is not provided with the installation kit. The Wheel Angle Sensor installation instructions are provided for special installations, when required.

Wheel Angle Sensor Overview

In order to add a Wheel Angle Sensor to this vehicle, additional parts are required. Contact your AutoSteer dealer to get the current part numbers and to order them if this accessory is desired. Table 3-1 provides the current parts that are required as a reference.

Table 3-1 AGCO Wheel Angle Sensor Kit Component Part Numbers

Item	Component	Part Number
1.	Wheel Angle Sensor Assembly Kit	200-0468-01
2.	AGCO Wheel Angle Sensor Brackets	200-0452-02

The Wheel Angle Sensor bracket kit includes two options for attaching the Wheel Angle Sensor to the front axle. Either option can be used.

Identifying the Front Axles

The AGCO, Challenger, and Massey Ferguson vehicles can use three different axle types. The small frame vehicles will be either the one shown in Figure 3-1 or the one shown in Figure 3-2. The large frame vehicles will use the one shown in Figure 3-3. Note that Axle Type 2 and Axle Type 3 look very similar. Axle Type 3 is larger and has the transfer case bolts farther apart.

The AutoSteer installation kit will work with any of the axle types. The kit also provides two alternative methods for attaching the Wheel Angle Sensor to the vehicle. Use the bracket that works best on the vehicle the system is being installed on.

Figure 3-1 Axle Type 1 Small Frame

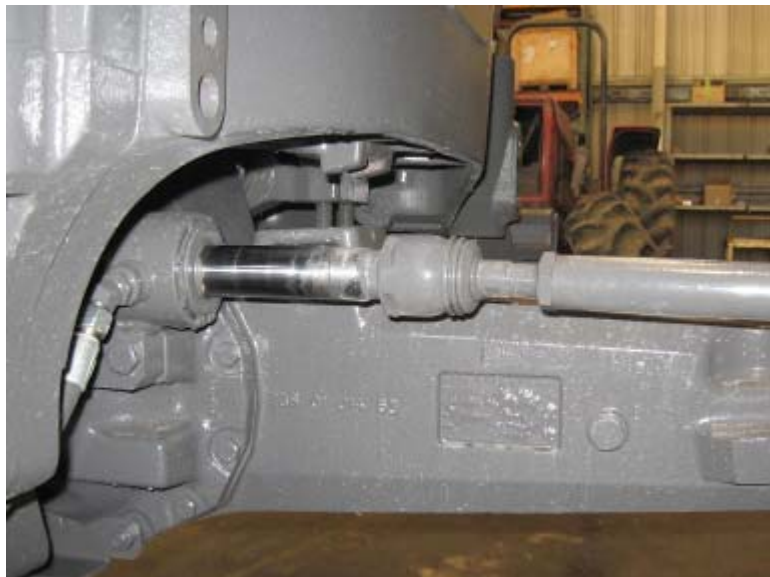


Figure 3-2 Axle Type 2 Small Frame



Note: Axle Type 2 and Axle Type 3 look very similar. Axle Type 3 is larger and has the transfer case bolts farther apart.

Figure 3-3 Axle Type 3 Large Frame



Wheel Angle Sensor Installation Procedure

Mount Option 1 Brackets on Axle Type 1

1. Identify the Wheel Angle Sensor mounting location on right side of the axle shown in Figure 3-4.

Figure 3-4 Wheel Angle Sensor Mounting Position



Option 1 Bracket
Installation Point

2. Remove the two bolts from the steering axle housing identified in with a 19mm socket and breaker bar as shown in Figure 3-5.

Note: These bolts are held with a thread locking compound and can be very tight.

Figure 3-5 Remove Bolts



Bolts to Remove

3. Attach the Option 1 Wheel Angle Sensor bracket to the vehicle with the two bolts removed as shown in Figure 3-6. Tighten the bolts with a 19mm socket and ratchet and then finish tightening with a breaker bar.

Figure 3-6 Option 1 Wheel Angle Sensor Bracket Installed



Option 1 Wheel Angle
Sensor Bracket

4. Attach the Wheel Angle Sensor to the Wheel Angel Sensor bracket with the two 3/8" x 5/8" bolts and flat washers as shown in Figure 3-7. Tighten the bolts with a 9/16" ratchet wrench.

Figure 3-7 Attach Wheel Angle Sensor



Wheel Angle Sensor

5. Attach the Wheel Angle Sensor Linkage Rod bracket to steering axle's linkage arm with the "U"-Clamp. The center of the "U"-Clamp bolt should be 6-1/4" (159mm) from the tie rod connector as shown in Figure 3-8. Tighten the nuts with a 1/2" ratchet wrench so that the "L" bracket is parallel to the ground.

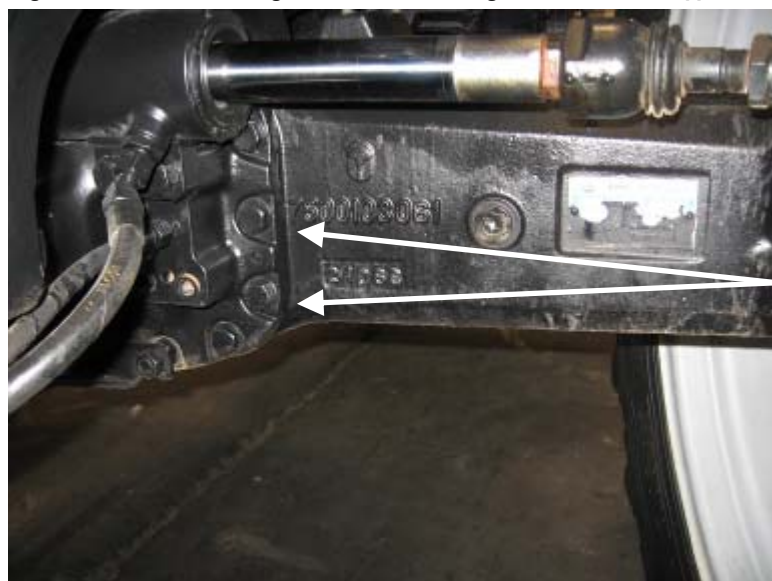
Figure 3-8 Wheel Angle Sensor Linkage Rod Bracket Mounted



Mount Option 1 Brackets on Axle Type 2 and 3

1. Identify the Wheel Angle Sensor mounting location on right side of the axle shown in Figure 3-9.

Figure 3-9 Wheel Angle Sensor Mounting Position (Axle Type 2 Shown)

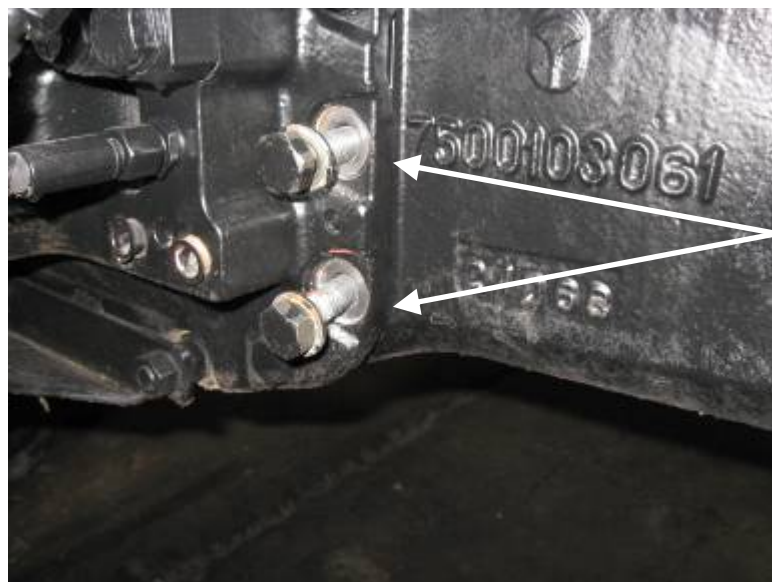


Option 1 Bracket
Installation Point

2. Remove the two bolts from the steering axle housing identified in with a 22mm socket and breaker bar as shown in Figure 3-10.

Note: These bolts are held with a thread locking compound and can be very tight.

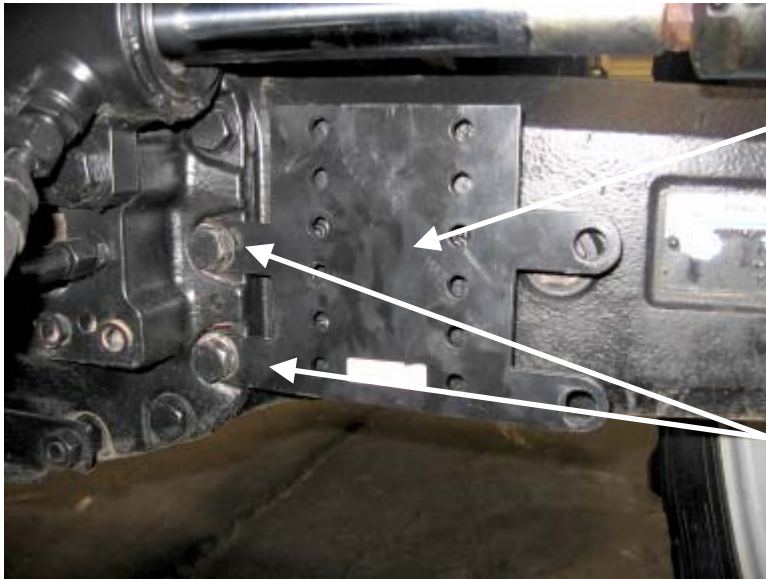
Figure 3-10 Remove Bolts (Axle Type 2 Shown)



Bolts to Remove

3. Attach the Option 1 Wheel Angle Sensor bracket to the vehicle with the two bolts removed in the previous step. Figure 3-11 shown the bracket attached to an Axle Type 2. Figure 3-12 shown the bracket held next to an Axle Type 3 for comparison. Tighten the bolts with a 22mm socket and ratchet and then finish tightening with a breaker bar.

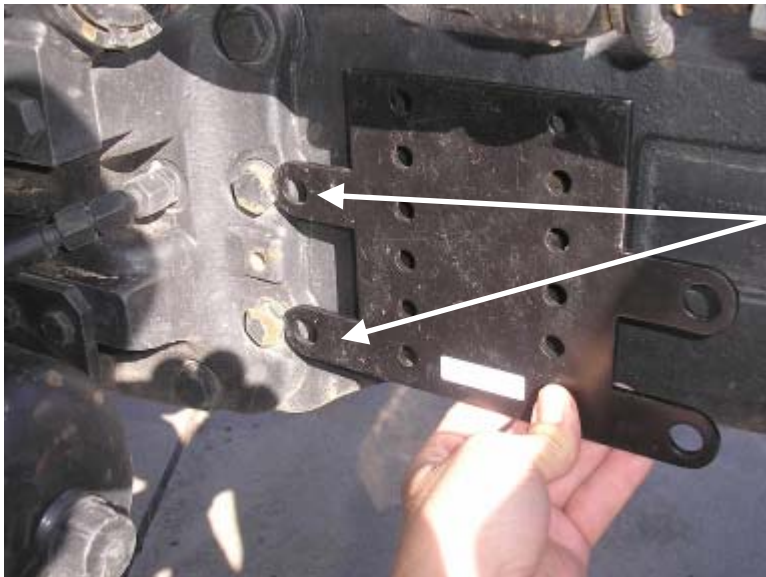
Figure 3-11 Option 1 Wheel Angle Sensor Bracket Installed (Axle Type 2 Shown)



Option 1 Wheel Angle
Sensor Bracket

Attach with Narrow Tabs

Figure 3-12 Bracket Shown on Axle Type 3 for Comparison



Attach with Wide Tabs

4. Attach the Wheel Angle Sensor to the Wheel Angel Sensor bracket with the two $\frac{3}{8}$ " x $\frac{5}{8}$ " bolts and flat washers as shown in Figure 3-13. Tighten the bolts with a $\frac{9}{16}$ " ratchet wrench. Verify the gap between the top of the Wheel Angle Sensor and the tie rod is adequate that the Wheel Angle Sensor will not get damaged.

Figure 3-13 Attach Wheel Angle Sensor (Axle Type 2 Shown)



Wheel Angle Sensor

5. Attach the Wheel Angle Sensor Linkage Rod bracket to steering axle's linkage arm with the "U"-Clamp. The center of the "U"-Clamp bolt should be 6- $\frac{1}{4}$ " (159mm) from the tie rod connector as shown in Figure 3-14. Tighten the nuts with a $\frac{1}{2}$ " ratchet wrench so that the "L" bracket is parallel to the ground.

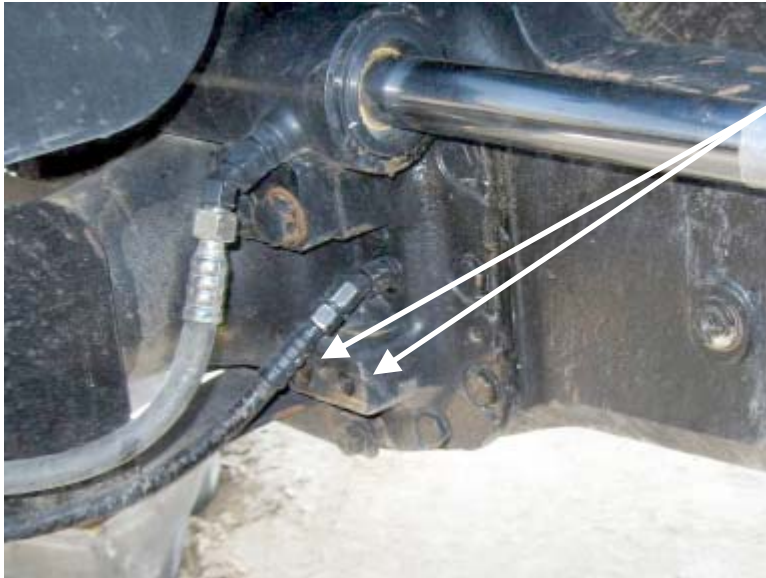
Figure 3-14 Wheel Angle Sensor Linkage Rod Bracket Mounted



Mount Option 2 Brackets on Axle Type 2 and 3

1. Identify the Wheel Angle Sensor mounting location on right side of the axle shown in Figure 3-15.

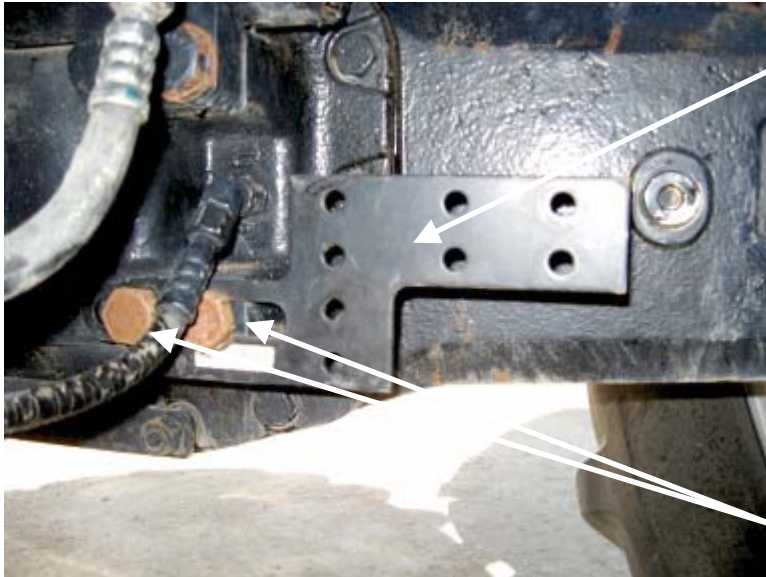
Figure 3-15 Wheel Angle Sensor Mounting Position (Axle Type 3 Shown)



Option 2 Bracket
Installation Point

2. Attach the Option 2 Wheel Angle Sensor bracket to the vehicle with the two M16 x 25mm bolts and flat washers provided with the kit as shown in Figure 3-16. Tighten the bolts with a 24mm socket and ratchet.

Figure 3-16 Option 2 Wheel Angle Sensor Bracket Installed (Axle Type 3 Shown)



Option 2 Bracket

Mounting Bolts

3. Attach the Wheel Angle Sensor to the Wheel Angel Sensor bracket with the two 3/8" x 5/8" bolts and flat washers as shown in Figure 3-17. Tighten the bolts with a 9/16" ratchet wrench.

Figure 3-17 Attach Wheel Angle Sensor (Axle Type 3 Shown)



Wheel Angle Sensor

4. Attach the Wheel Angle Sensor Linkage Rod bracket to steering axles linkage arm with the "U"-Clamp. The center of the "U"-Clamp bolt should be 6-1/4" (159mm) from the tie rod connector as shown in Figure 3-18. Tighten the nuts with a 1/2" ratchet wrench so that the "L" bracket is parallel to the ground.

Figure 3-18 Wheel Angle Sensor Linkage Rod Bracket Mounted



Cut the Wheel Angle Sensor Rods

The Wheel Angle Sensor rods are shipped longer than they need to be. These rods must be cut to the proper length to allow the linkage rods to provide the Wheel Angle Sensor the maximum number of counts as the steering wheel is turned from full right to full left. Due to the variability of the possible mounting positions and axle options, it is the responsibility of the installer to verify the lengths provided in Table 3-2 are correct for each individual installation prior to cutting the rods.

Table 3-2 provides the typical rod lengths that work for most installations. Before cutting the linkage rods to these measurements, verify that the Wheel Angle Sensor brackets have been attached to the vehicle as shown in this manual and that they are attached the correct distance from any reference points shown. If the axle does not allow the Wheel Angle Sensor brackets to be installed as shown, do not cut the rods until it is determined what the proper lengths are for your installation.

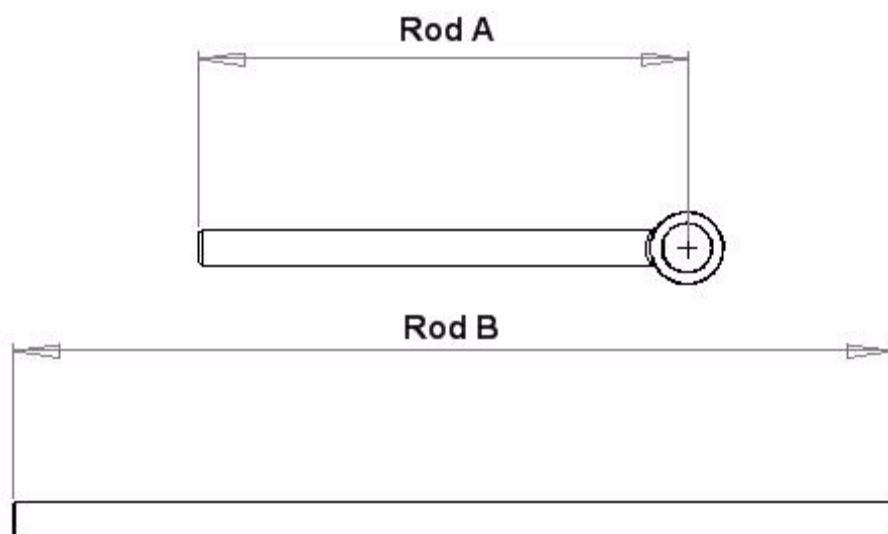
Even if the brackets can be attached as shown, these measurements may need to be slightly different to take into account minor installation differences. These measurements are provided as a reference only. The installer is responsible for verifying that the provided measurements will work prior to cutting the rods.

Refer to Figure 3-19 to determine where the measurement points on the rods are taken to get the values provided in Table 3-2.

Table 3-2 Linkage Rod Cut Lengths

Item	Option 1 Bracket	Option 2 Bracket
Rod A	4-1/2 inches (114 mm)	4-3/4 inches (121 mm)
Rod B	7-5/8 inches (194 mm)	9-1/4 inches (235 mm)

Figure 3-19 Linkage Rod Cut Length Measurement Points



1. Use a metal hack saw and vice as shown in Figure 3-20 to cut the Wheel Angle Sensor linkage rods to the proper lengths.

Note: Protect the threads from damages while cutting the rods. It is advisable to attach a nut on the side of the linkage rod that is going to be kept in order to clean the threads after the cut has been made.

Figure 3-20 Linkage Rod Cutting

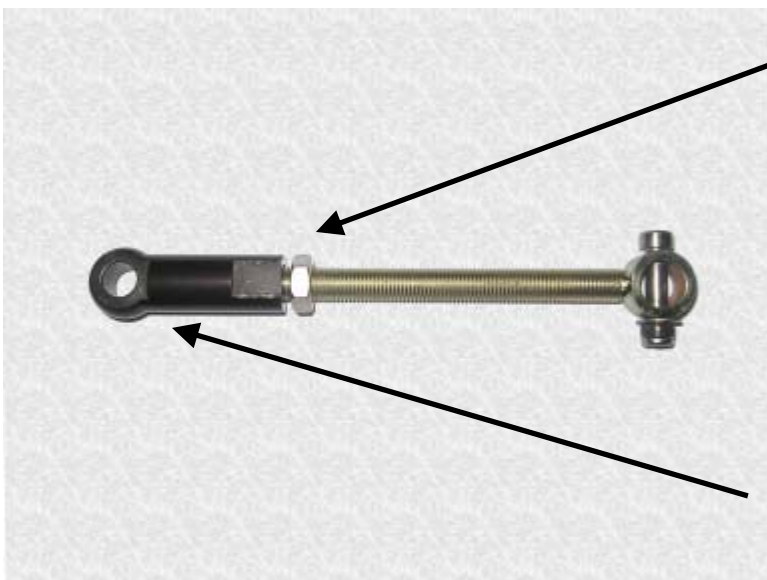


Assemble the Linkage Rod Hardware

After cutting the rods to the correct length, assemble the rods as described. The photos are provided as a reference only. The lengths of the actual rods will be different than what is shown in the pictures.

1. Attach the locking nut to the end of Rod A.
2. Connect the eye connector to the end of the Wheel Angle Sensor rod. See Figure 3-21.

Figure 3-21 Rod A Assembled



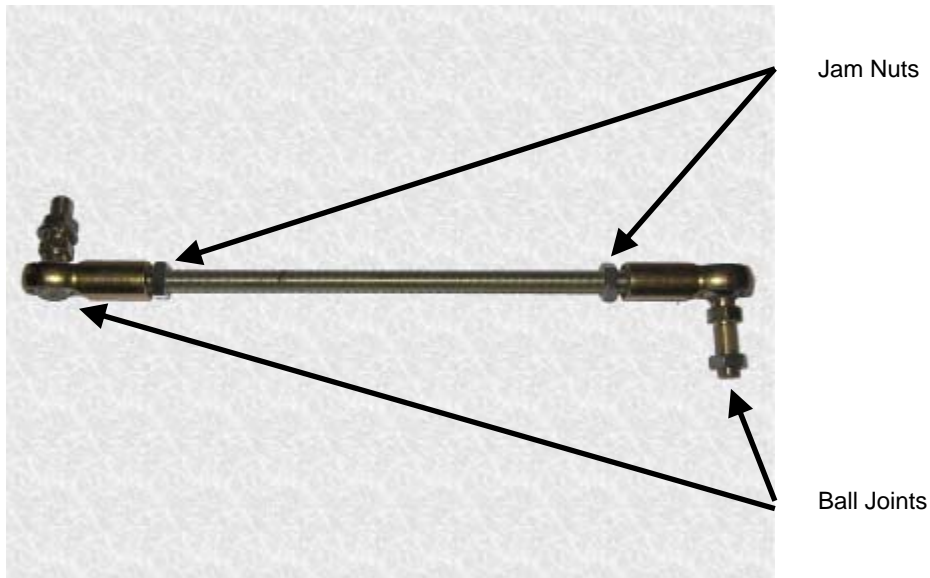
Locking Nut

Eye Connector

3. Attach the locking nuts to each end of the linkage Rod B
4. Attach the ball joints to both ends of the linkage arm. See Figure 3-22.

Note: The bolts for the ball joints should be facing the opposite direction as shown in Figure 3-22 for this installation.

Figure 3-22 Linkage Rod Assembled



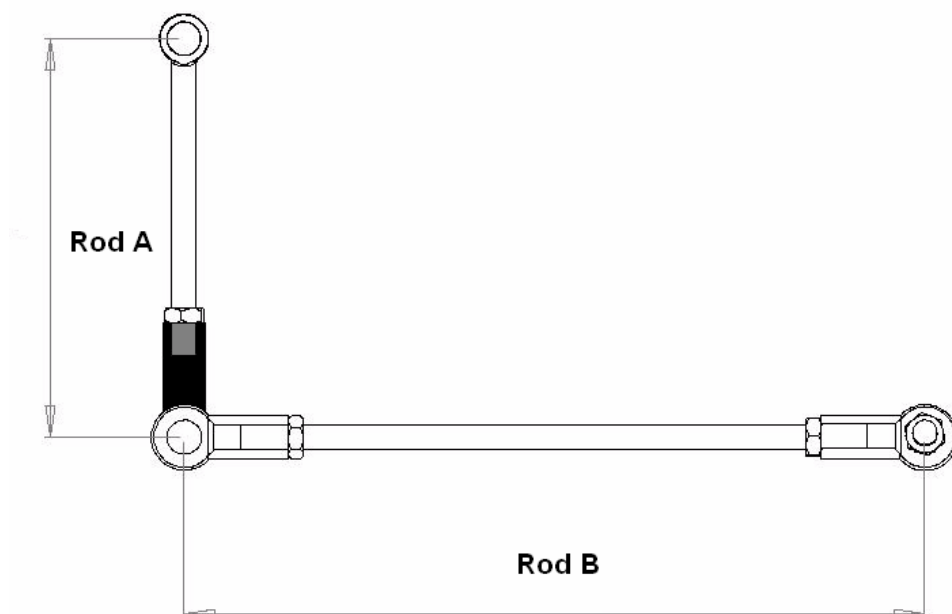
- For most installations, use Table 3-3 to adjust the lengths of the rod assemblies to the values shown. Figure 3-23 shows where the measurement points for each rod are taken.

Note: Due to the variation of axle types and installation points, these measurements are provided as a reference only. Before connecting the steering rods and turning the steering axle verify that these lengths will work and the sensor will not be damaged.

Table 3-3 Assembled Linkage Rod Length

Item	Option 1 Bracket	Option 2 Bracket
Rod A	5-1/2 inches (140 mm)	5-3/4 inches (146 mm)
Rod B	9-5/8 inches (244 mm)	11-1/4 inches (286 mm)

Figure 3-23 Assembled Linkage Rod Measurement Points



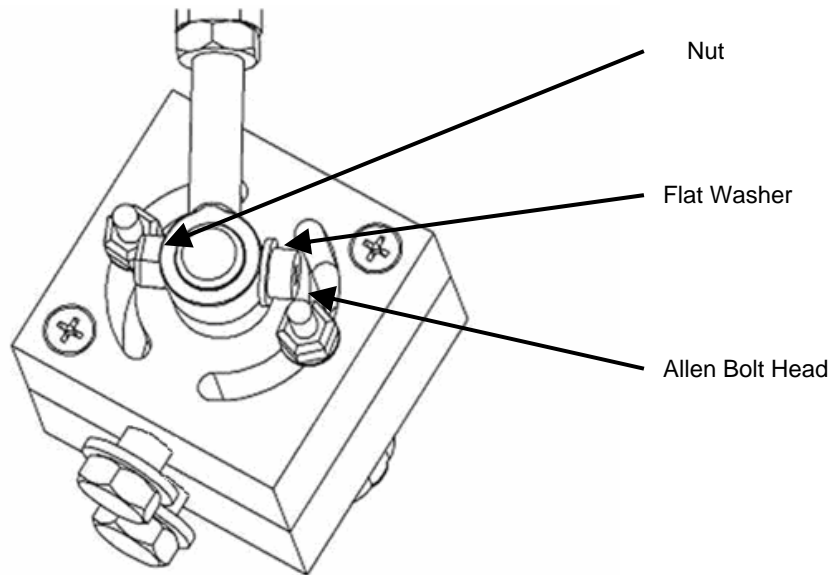
Attach Wheel Angle Sensor Rods to Brackets and Adjust

Each of the bracket options and axle configurations will appear slightly different. However, the procedure for connecting and testing the rod lengths are the same.

1. Attach the Wheel Angle Sensor rod to the Wheel Angle Sensor. The rod will point backwards.

Note: The flat washer goes on the bolt head side and NOT the nut side when attaching the arm. See Figure 3-24.

Figure 3-24 Washer on Shaft Bolt



Note: The bolts should stick out of the bottom of the Wheel Angle Sensor and are used to prevent the sensor from being accidentally over extended by hand. Ensure these bolts are installed correctly. These bolts will not stop the hydraulics from over extending the sensor. Verify the fit prior to manually or automatically moving the Wheel Angle Sensor fully connected.


2. Tighten the bolt on the Wheel Angle Sensor shaft with a 1/8" Allen wrench and a 3/8" open end wrench.

3. Attach the linkage rod to the linkage bracket. The bolt attaches from below the “L” bracket and the nut and lock washer go on top. Tighten the ball joint to the bracket with a 1/2" and 9/16" wrench. Figure 3-25 shows both rods connected to the brackets.

Figure 3-25 Linkage Connections (Bracket Option 2 and Axle Type 3 Shown)



Note: Never attach the linkage rods to Wheel Angle Sensor rod and turn the steering wheels manual or automatically until the fit has been verified. The linkage rods must remain apart while the steering wheels are turned to the maximum right and left positions and then temporarily attached at these positions. Failure to do this may cause the Wheel Angle Sensor or vehicle to become damaged.

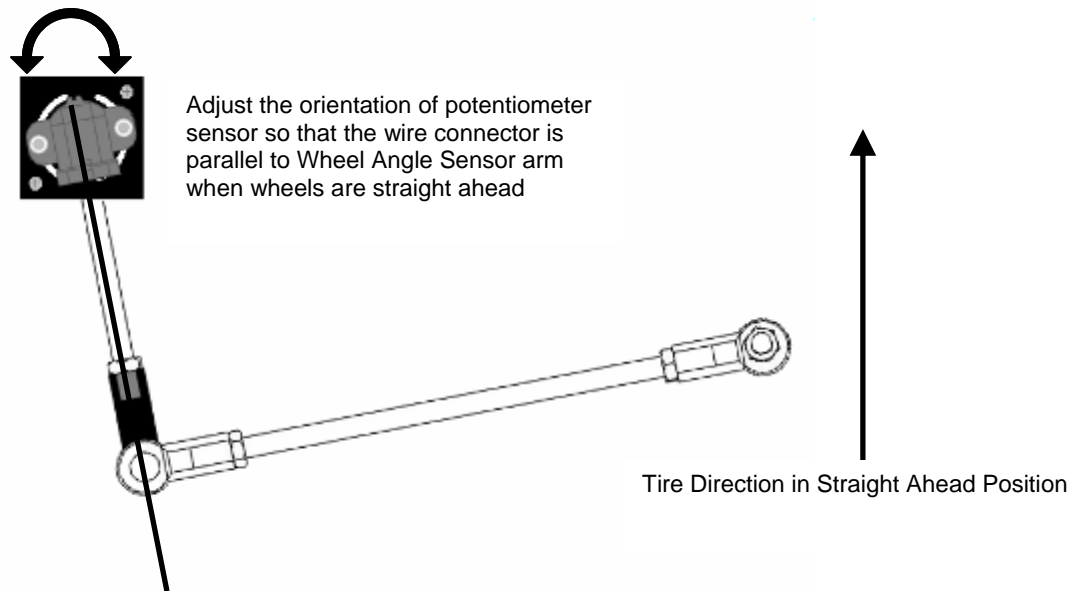
	<p style="text-align: center;">⚠ WARNING</p> <p>Always shut down the vehicle when working around the steering axle and checking and adjusting the Wheel Angle Sensor rod lengths. The steering axle could move suddenly and cause severe injury or death.</p>
---	--

Note: Before adjusting the Wheel Angle Sensor linkage rods, verify the steering wheels physical stops on the vehicle are adjusted to the maximum setting the vehicle operator is going to use. If these physical stops are changed after the Wheel Angle Sensor has been adjusted, the Wheel Angle Sensor could be damaged when the wheels are turned farther than what it was originally adjusted to work at.

4. With the linkage rods disconnected, start the vehicle and manually turn the steering wheel so that the vehicle will travel straight ahead when moving.
5. Temporarily attach the linkage rods together.

6. Rotate the Wheel Angle Sensor potentiometer on top of the mounting block so that the plastic wire connector is parallel to the Wheel Angle Sensor rod. See Figure 3-26.

Figure 3-26 Adjust Potentiometer Angle to Match Straight Ahead Wheel Position



7. After the potentiometer has been adjusted, tighten the potentiometer bolts with a 3/8" wrench and 5/32" Allen wrench
8. Disconnect the linkage rods and turn the steering wheel manually to the full left position.

Note: The vehicle may need to be driven a short distance in order to get the steering system to move to the full left position

9. Reattach the linkage assembly and verify that the sensor and linkage rods will not be damaged. Adjust the rod lengths as necessary. See Figure 3-27.

Figure 3-27 Confirm Maximum Steer Left Position (Bracket Option 1 and Axle Type 1 Shown)



10. Disconnect the linkage rods and turn the steering wheel manually to the full right position.

Note: The vehicle may need to be driven a short distance in order to get the steering system to move to the full right position

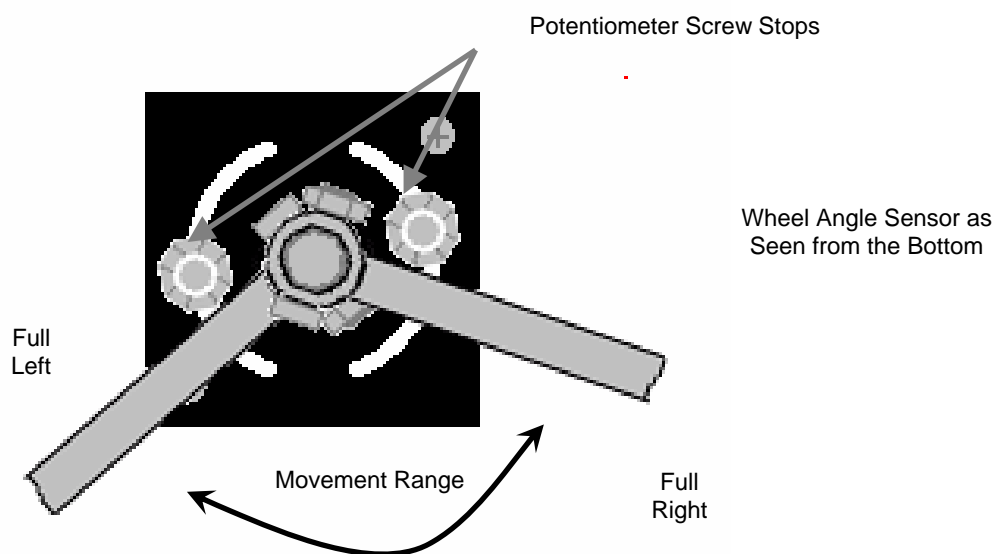
11. Reattach the linkage assembly and verify that the sensor and linkage rods will not be damaged. Adjust the rod lengths as necessary. See Figure 3-28.

Figure 3-28 Confirm Maximum Steer Right Position (Bracket Option 1 and Axle Type 1 Shown)



12. Repeat Steps 4 through 11 until the rod lengths have been adjusted and the potentiometer is centered to get the maximum sensor movement. The maximum movement is reached when the Wheel Angle Sensor rod will sweep from approximately 3/16 inch (5mm) from both bolt heads holding the potentiometer on to the mounting block when the wheels are turned to the maximum right and left positions. See Figure 3-29.

Figure 3-29 Maximum Sensor Movement



Note: An Ohm meter can also be used to determine if there is enough sensor movement. Connect the Ohm meter to pins A and B of the Wheel Angle Sensor. Measure the Ohm reading at the maximum left and right position. After subtracting the smaller number from the larger number, there should be at least a 3.75 Kilo-Ohms change. The reading should also never go below 1.5 or higher than 6.6 Kilo-Ohms as this is reaching the limits of the potentiometer and could damage the sensor.

13. Once all the adjustments are complete, tighten all lock nuts and bolts on the linkage and Wheel Angle Sensor rod. A 1/2" and two 9/16" wrenches are required to tighten all the connections. Figure 3-30 shows the Wheel Angle Sensor fully installed.

Figure 3-30 Wheel Angle Sensor Installed (Bracket Option 1 and Axle Type 1 Shown)



SA Module Installation

The **SA Module Installation** chapter contains information in the following section:

- *SA Module Mounting Orientation*
- *Mount the SA Module on Small Frame Models*
- *Mount the SA Module on Large Frame Models*

The SA Module is mounted in different positions depending on if the system is being installed on a small frame model or a large frame model. Follow the instructions for the vehicle the system is being installed on.

SA Module Mounting Orientation

The SA Module can also only be mounted in certain orientations. Figure 4-1 shows the correct mounting positions and Figure 4-2 shows the improper mounting positions.

Figure 4-1 Correct SA Module Mounting Orientations

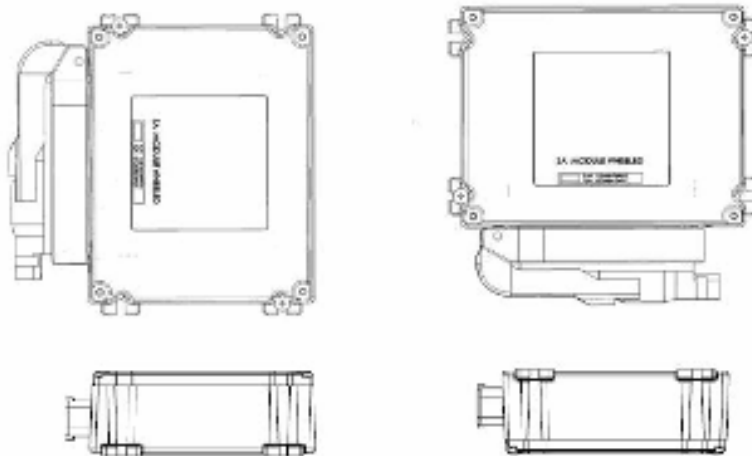
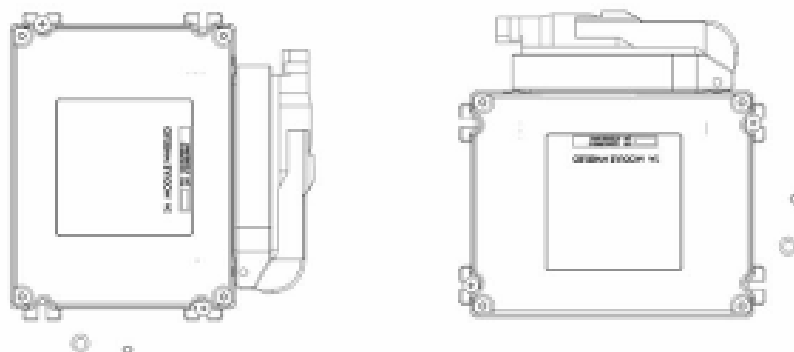


Figure 4-2 Incorrect SA Module Mounting Orientations



Due to the variety of options available on vehicles and the possible configuration differences, it may be necessary to install the SA Module in location other than the example shown here. If an alternative location is required, choose a location where the SA Module can be protected from damage from moving parts or crop debris and excessive moisture from weather and cleaning equipment.

Mount the SA Module on Small Frame Models

1. Locate the SA Module mounting position on the frame of the tractor on the left side near the pivot point shown in Figure 4-3.

Figure 4-3 Locate SA Module Mounting Position



SA Module
Bracket
Mounting Bolt

2. Remove the rear bolt holding the Power Beyond bracket as shown in Figure 4-4 with a 13mm socket and ratchet.

Figure 4-4 Remove Bolt Holding Power Beyond Bracket



Remove Bolt

3. Start two of the SA Module mounting screws on the “L”-bracket side of the SA Module mounting bracket.
4. Attach the SA Module mounting bracket to the frame of the vehicle using the bolt just removed as shown in Figure 4-5. Tighten the bolt with a 13mm socket and ratchet.

Figure 4-5 SA Module Bracket Installed



SA Module
Mounting
Screws Started

Bolt Securing
SA Module
Bracket

5. Attach the SA Module to the SA Module bracket and secure with the other two Phillips screws. Tighten the SA Module to the bracket with a #2 Phillips screwdriver. Figure 4-6 shows the SA Module installed

Figure 4-6 SA Module Mounted



Mount the SA Module on Large Frame Models

1. Locate the SA Module mounting position on the frame of the left, rear cab support top bolt shown in Figure 4-7.

Figure 4-7 Locate SA Module Mounting Position



SA Module
Bracket
Mounting Bolt

2. Remove the nut and flat washer from the cab support bolt with a 16mm wrench and 17mm socket and ratchet. See Figure 4-8.

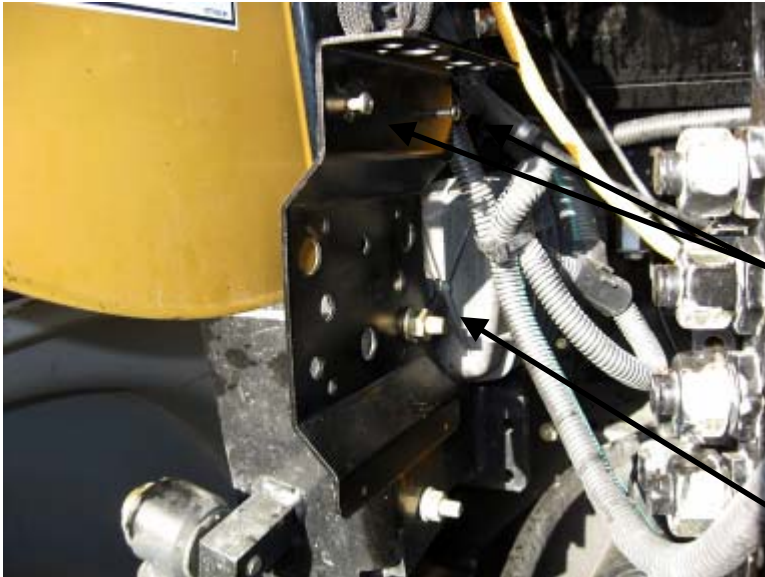
Figure 4-8 Remove Bolt



Remove Nut
and Flat Washer

3. Start two of the SA Module mounting screws on the “L”-bracket side of the SA Module mounting bracket.
4. Attach the SA Module mounting bracket to the frame of the vehicle using the flat washer and nut removed in the previous step as shown in Figure 4-9. Tighten the bolt with a 16mm wrench and 17mm socket and ratchet.

Figure 4-9 SA Module Bracket Installed

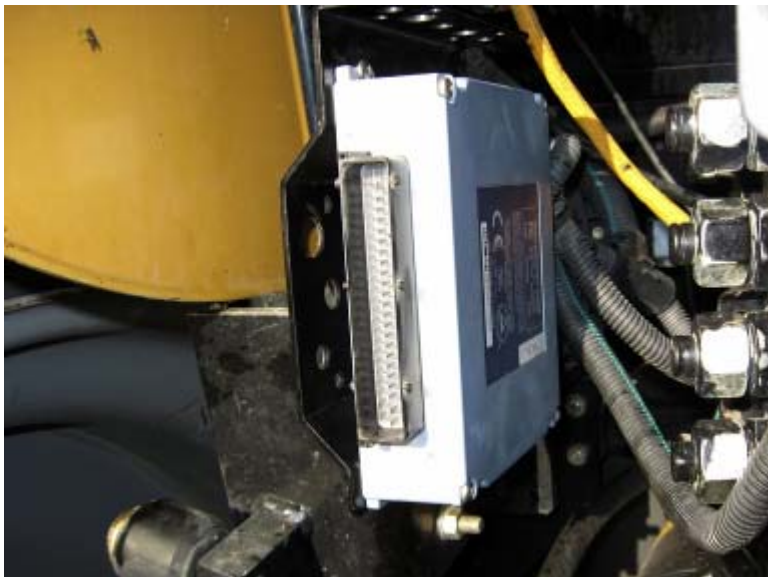


SA Module
Mounting
Screws Started

Bolt Securing
SA Module
Bracket

5. Attach the SA Module to the SA Module bracket and secure with the other two Phillips screws. Tighten the SA Module to the bracket with a #2 Phillips screwdriver. Figure 4-10 shows the SA Module installed.

Figure 4-10 SA Module Mounted



Roof Module Installation

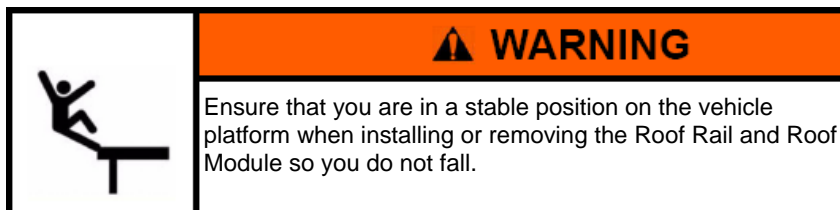
The **Roof Module Installation** chapter contains information in the following sections:

- *Safety Notes*
- *AGCO and Massey Ferguson Roof Rail Installation*
- *Challenger Roof Rail Installation*

Safety Notes

- The AutoSteer system must be powered OFF when installing or removing the Roof Module.
- The Roof Module must always be firmly secured to the roof rail using the hardware provided whenever the vehicle is in operation to prevent the Roof Module from releasing from its bracket and falling.
- The Roof Module must be removed when transporting the vehicle at speeds above 30 mph (48 km/h).
- Ensure you are in a stable position on the vehicle platform when removing the Roof Module so that you do not fall or drop the Roof Module.
- Use a ladder to install the AutoSteer Roof Rail

The AGCO and Massey Ferguson models have slightly different cabs than the Challenger models. Because of this, there are two different Roof Rail mounting brackets and different instructions depending on the vehicle make. Follow the procedure for the vehicle that the system is being installed on.



AGCO and Massey Ferguson Roof Rail Installation

1. Locate the two Torx screws on the left side of the cab used to mount to optional beacons shown in Figure 5-1.

Figure 5-1 Mounting Screw Location



Torx Screw
Locations

2. Remove the Torx screws with a T40 Torx socket and ratchet and store in a safe place.
3. Use the new, longer M8 x 25mm bolts and flat washers provided with the installation kit and attach the Roof Rail mounting bracket to the side of the cab as shown in Figure 5-2. Tighten the bolts with a 13mm socket and ratchet.

Figure 5-2 Attach the Roof Rail Mounting Bracket (Left Side Shown)



Roof Rail
Mounting Bracket

4. Repeat the above process and attach the other Roof Rail mounting bracket on the right side of the cab.

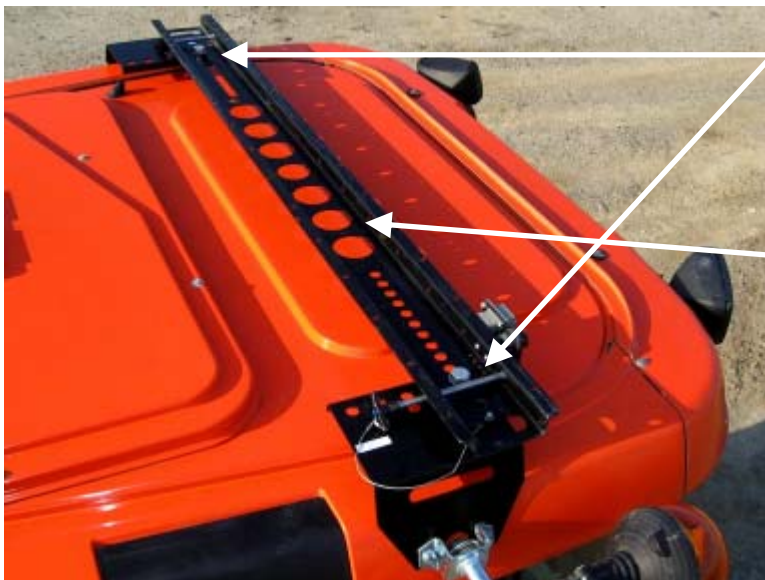
5. If the optional beacon is installed, the beacon can be rotated backwards to facilitate the rest of the installation as shown in Figure 5-3.

Figure 5-3 Rotate Beacon Backwards



6. Place the Roof Rail on top of the Roof Rail mounting brackets and center it over the cab.
7. Attach the Roof Rail using the 5/8" x 1-1/2" bolts, washers, and nuts provided by the installation kit. Tighten the bolts with a 15/16" socket and ratchet. See Figure 5-4.

Figure 5-4 Attach Roof Rail



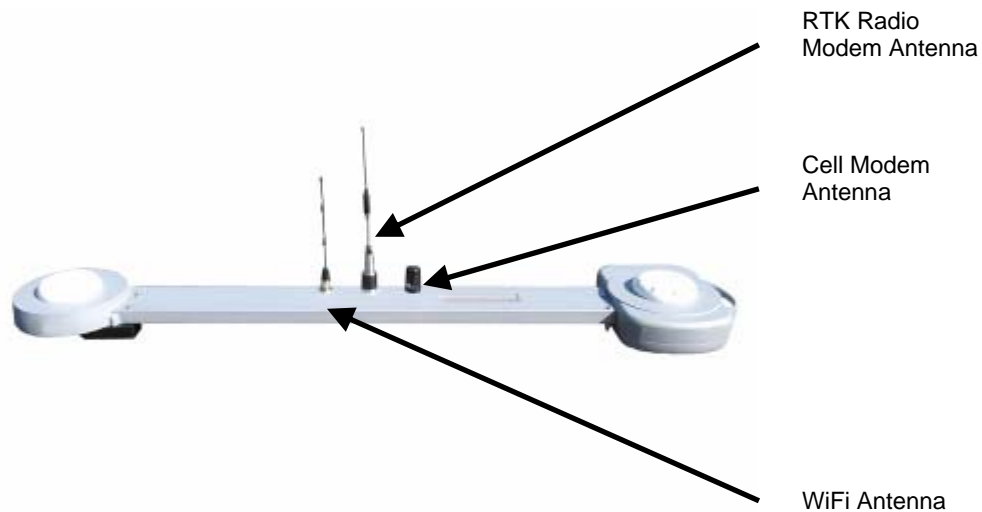
Mounting Bolt

Roof Rail

8. Attach the three antennas to the proper antennas connections on the Roof Module. See Figure 5-5.

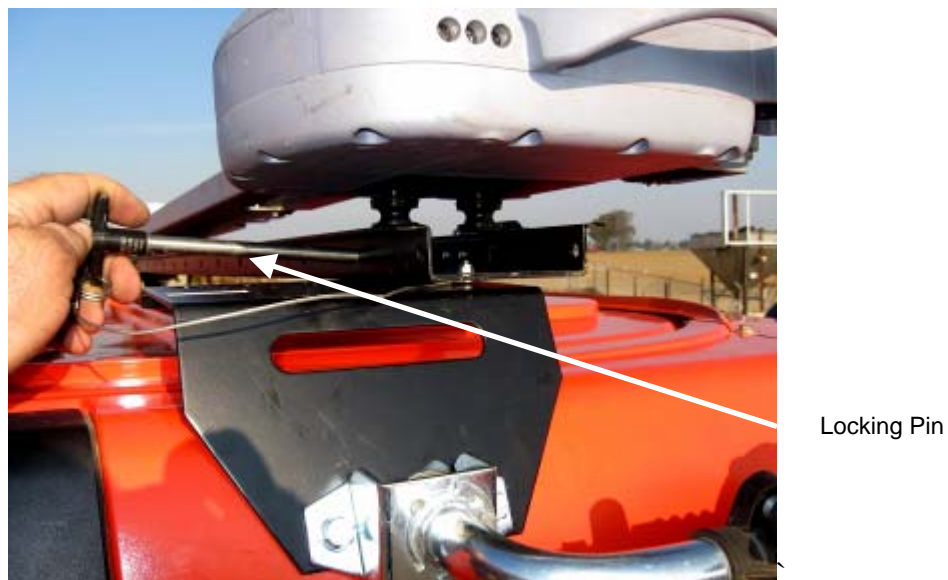
Note: Hand tighten the connections. Do not over tighten.

Figure 5-5 Attach the Antennas



9. Place the Roof Module on the Roof Rail.
10. Remove the locking pin from the Roof Rail. See Figure 5-6.

Figure 5-6 Removing the Locking Pin



11. Adjust the Roof Module position on the Roof Rail.
12. Re-insert the locking pin to lock the Roof Module onto the vehicle. See Figure 5-7.

Figure 5-7 Locking Pin Inserted



Roof Module
Locked in

13. If the beacon is installed on this vehicle, it can now be rotated back in the up position as shown in Figure 5-8

Figure 5-8 Rotate Beacon Back Up



14. The Roof Module is now installed. See Figure 5-9.

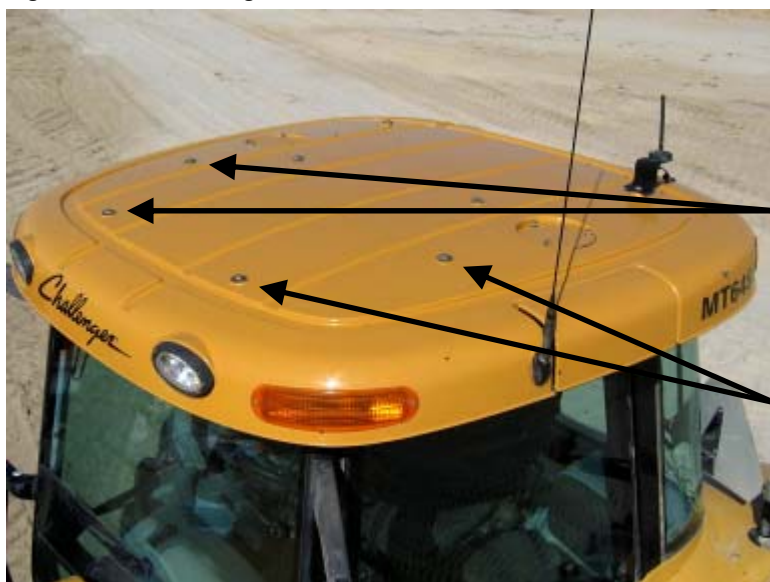
Figure 5-9 Roof Module Installed



Challenger Roof Rail Installation

1. Locate the four mounting bolts on the front side of the cab shown in Figure 5-10.

Figure 5-10 Mounting Bolts Location

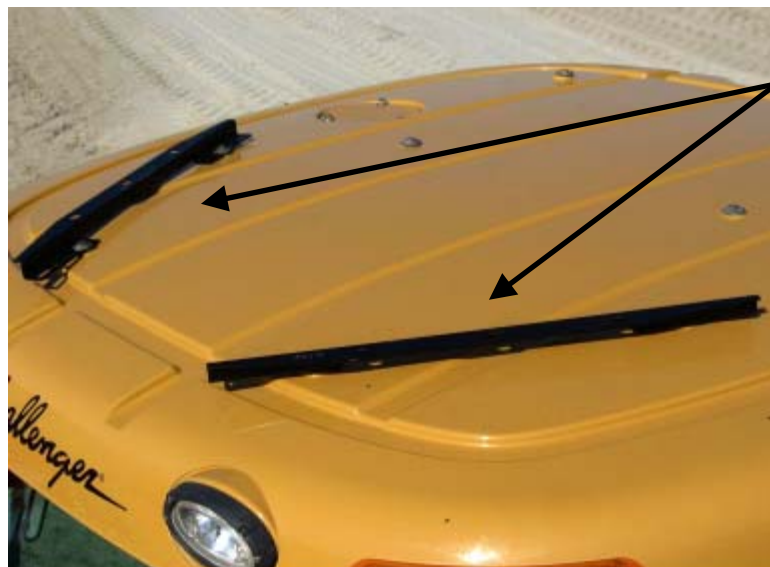


Right Side Roof
Bolts

Left Side Roof
Bolts

2. Remove the four bolts with a 13mm socket and ratchet. Leave the rubber gasket but remove the flat washer.
3. Mount the two Roof Rail mounting brackets as shown in Figure 5-11 using the bolts and flat washers removed in the previous step. Tighten the bolts with a 13mm socket and ratchet. The flat Roof Rail mounting tab should point to the outside of the cab on both sides.

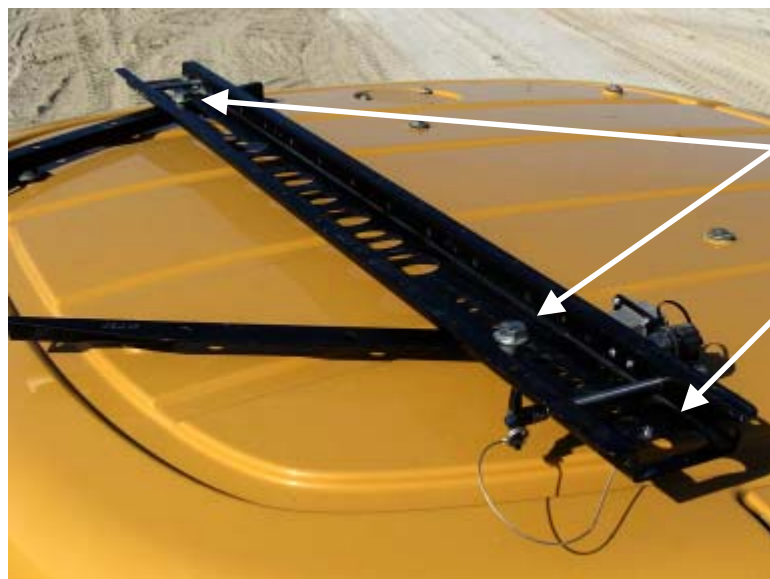
Figure 5-11 Attach the Roof Rail Mounting Bracket



Roof Rail
Mounting Brackets

4. Place the quick attach rail on top of the Roof Rail mounting brackets and center it over the cab.
5. Attach the Roof Rail using the 5/8" x 1-1/2" bolts, washers, and nuts provided by the installation kit. Tighten the bolts with a 15/16" socket and ratchet. See Figure 5-12.

Figure 5-12 Attach Quick Attach Rail



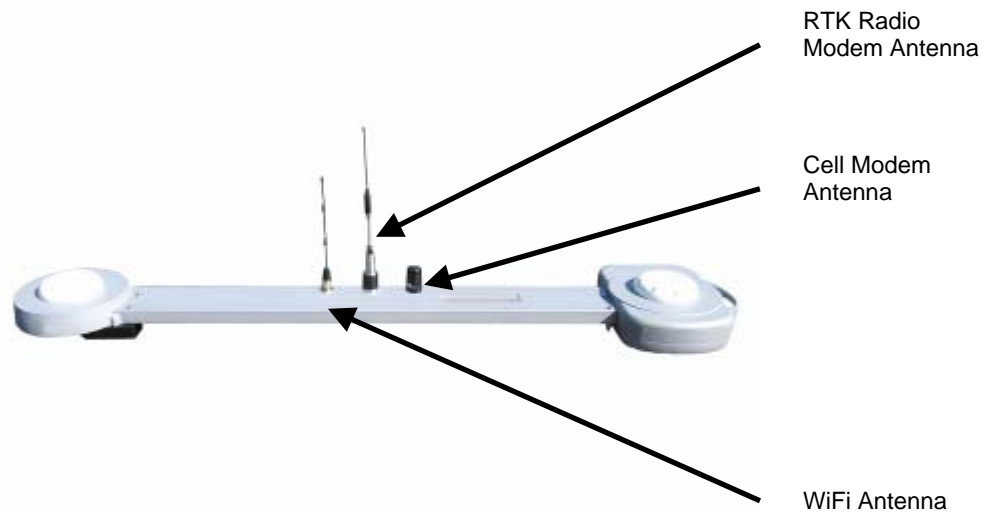
Mounting Bolt

Roof Rail

6. Attach the three antennas to the proper antennas connections on the Roof Module. See Figure 5-13.

Note: Hand tighten the connections. Do not over tighten.

Figure 5-13 Attach the Antennas



7. Place the Roof Module on the Roof Rail.
8. Remove the locking pin from the Roof Rail. See Figure 5-14.

Figure 5-14 Removing the Locking Pin



9. Adjust the Roof Module position on the Roof Rail.

10. Re-insert the locking pin to lock the Roof Module onto the vehicle. See Figure 5-15.

Figure 5-15 Locking Pin Inserted



Roof Module
Locked in

11. The Roof Module is now installed. See Figure 5-16.

Figure 5-16 Roof Module Installed



Display Installation

The **Display Installation** chapter contains information in the following sections::

- *Introduction*
- *Installation Procedure*

Introduction

This manual provides the instructions for installing the RAM mount ball in the cab so that the Display can be attached later. Refer to your Display user manual for instructions on installing the Display

If the location shown for mounting the Display is being used by another piece of equipment, other mounting locations can be used. However, for best performance and ease of use, use the location shown in the installation manual.

Installation Procedure

1. Locate the mounting bar on the right side cab door shown in Figure 6-1.

Figure 6-1 Identify the Bracket Mounting Holes



Mounting Bar for Display Bracket

2. Attach the Display bracket to the mounting bar with the two 5/16" x 1-3/8" "U"-bolts, washers, and nuts included with the Display bracket installation kit as shown in Figure 6-2. Tighten the bracket with a 1/2" socket and ratchet.
3. Install the four vinyl caps over the bolts to protect the operator from being scratched.

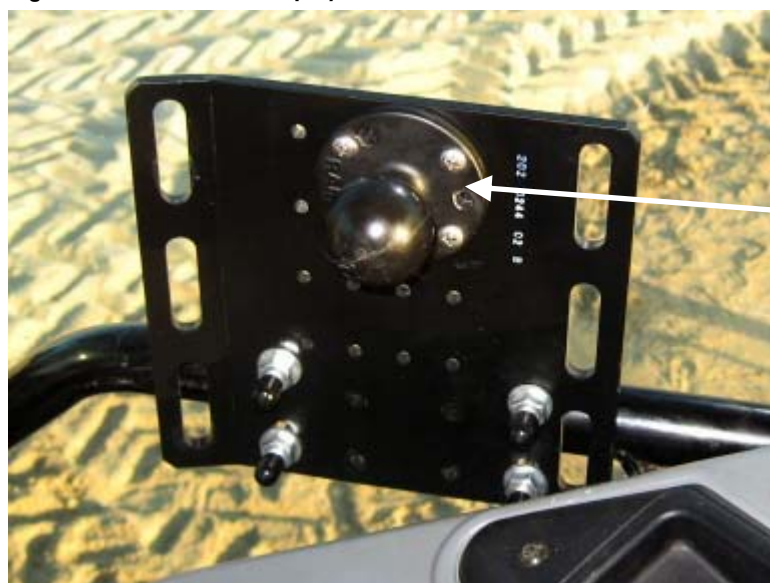
Figure 6-2 Monitor Bracket Installed



"U"-Brackets

4. Attach the RAM mount ball to mounting bracket using the four 10-32x3/4 Phillips screws and lock nuts provided. Tighten using a 3/8" wrench and #2 Philips screwdriver. See Figure 6-3.

Figure 6-3 Mounted Display Bracket



RAM Mount Base

Note: Refer to the Display user manual for the remaining Display specific installation instructions.

Connecting System Cables

The **Connecting System Cables** chapter provides information in the following sections:

- *SA Module Harness*
 - *SA Module Connection*
 - *Steering Valve Connections*
 - *Wheel Angle Sensor Connection (Optional)*
 - *SA Power and Data Harness*
- *Main Cable Harness*
 - *Roof Module*
 - *SA Module Harness*
 - *Display*

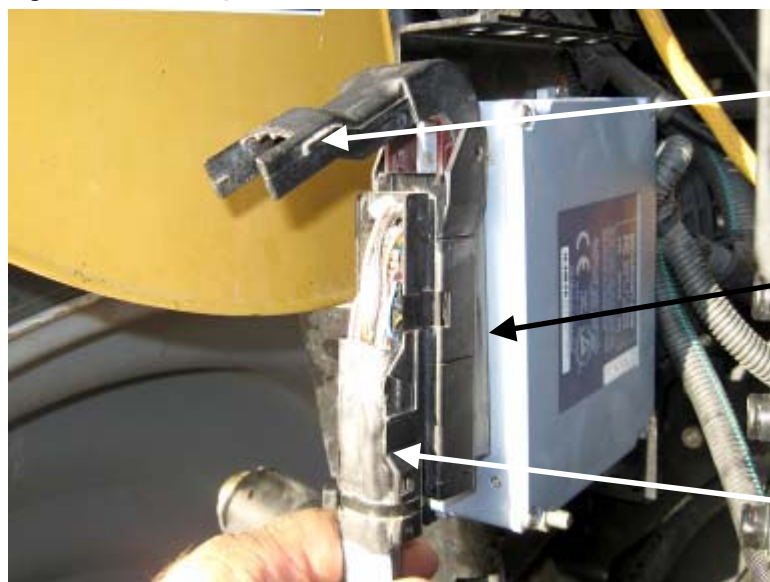
SA Module Harness

SA Module Connection

1. Open the latch of the SA Module Harness and line up the SA Module Harness connector with the SA Module. See Figure 7-1.

Note: The pictures in this manual show the SA Module connections being installed on a large frame vehicle. Follow the same procedure for installing on a small frame vehicle.

Figure 7-1 Line Up SA Module Connector



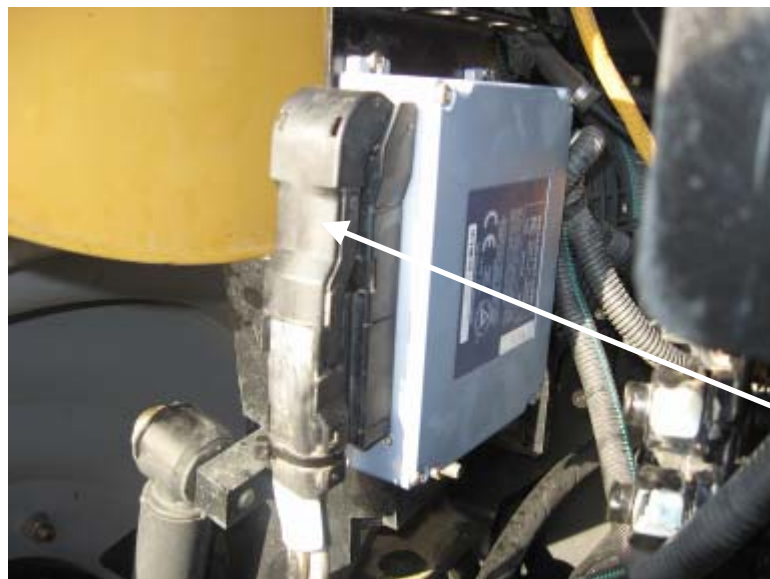
Locking
Mechanism in
Open Position
(Latch)

Bottom of SA
Module

Cable
Connector

2. Close the latch on the SA Module Harness connector. As the latch is closed, the connector will be pulled towards the SA Module and lock it into place. See Figure 7-2.

Figure 7-2 Close SA Module Harness Latch

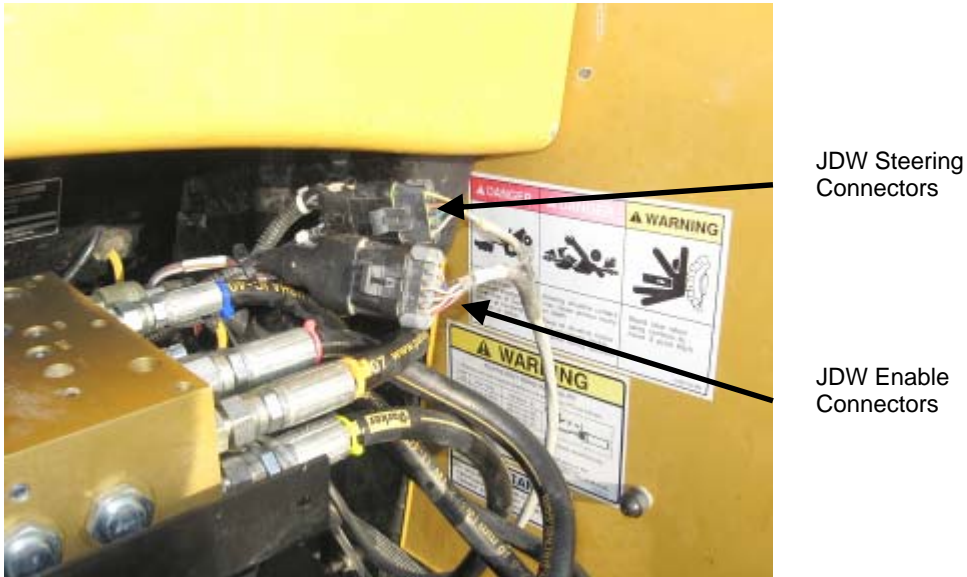


Locked
Position
(Closed)

Steering Valve Connection

1. Route the SA Module Harness's "JDW Enable" and "JDW Steering" connectors to the right side of the vehicle behind the valve stack.
2. Connect the 12 pin "JDW Enable" and the 4 pin "JDW Steering" connectors to the Steering Valve Harness. See Figure 7-3.

Figure 7-3 Steering Valve Connections



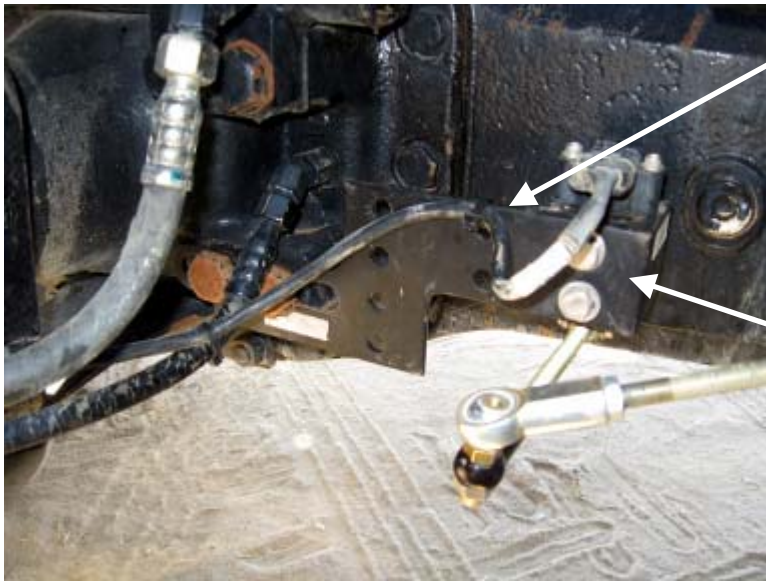
Wheel Angle Sensor Connection (Optional)

Skip this section if no Wheel Angle Sensor has been installed on the vehicle.. These instructions only show connecting to the Option 2 Bracket and Axle Type 3 vehicle Wheel Angle Sensor installation. Follow the same procedure for other Wheel Angle Sensor mounting options and frame types.

1. Route the SA Module Harness's 3-pin cable labeled "JDW Pot" to the right side of the vehicle along the rear of the vehicle.
2. Using the cable puller pole if necessary, pull the cable under the cab on the right side towards the engine compartment.
3. Feed the cable down to the steering lines at the engine compartment and then forward to the Wheel Angle Sensor Mounting location.

4. Attach the SA Module harness cable to the Wheel Angle Sensor.
5. Secure the cable to the Wheel Angle Sensor bracket near the Wheel Angle Sensor with a cable tie to prevent the connector from having to support the cable as shown in Figure 7-4.

Figure 7-4 Attach Wheel Angle Sensor



Cable Tied to Bracket

Wheel Angle Sensor

6. Neatly coil any excess cable and secure the cable along the route with cable ties to prevent it from getting damaged by moving parts. Ensure the cable is not stretched in any way when the vehicle moves.

SA Power and Data Harness

1. Open the rear window on the vehicle. If necessary, cut a slot in the rubber wire access grommet as shown in Figure 7-5.

Figure 7-5 Open Back Window



Rubber Access
Grommet

2. Feed the SA Module Harness's "SAM Power" and "SAM Data" cables into the cab through the wire access port as shown in Figure 7-6 to be connected later.

Figure 7-6 Route SA Module Cable into Cab



Main Cable Harness

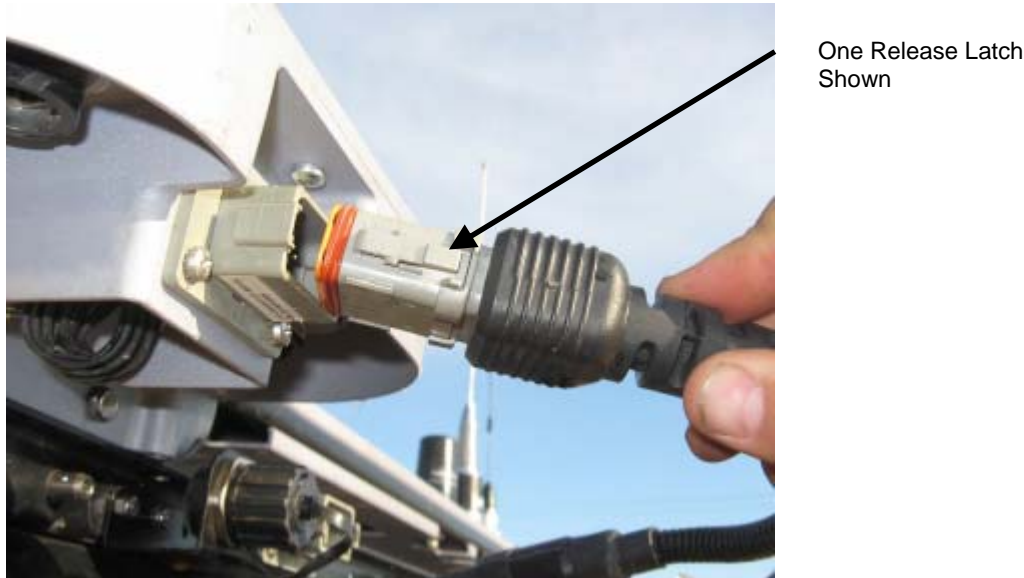
Roof Module

1. Attach the Main Cable Harness's "Roof Module" connector to the Roof Module as shown in Figure 7-7.

Orient the 12-pin connector so the word "TOP" on the cable connector is pointing upwards (towards the sky). Insert the cable connector into the Roof Module. Push the connector in until it "clicks" and locks in place. To remove, grasp the connector to compress the two side latches and pull away from the Roof Module.

Note: Do not force the connector. If the connector does not engage easily, check for the correct orientation of the connector.

Figure 7-7 Attach Roof Module Connector



2. Attach the Main Cable Harness's "Roof Module Eth" connector to the Roof Module as shown in Figure 7-8.

Orient the Ethernet cable connector with the connector under the receiver so the contacts on the cable connector are pointing towards the back of the vehicle. (This will usually be towards your right side if you are standing on the left side of the vehicle and looking towards the Roof Module.) Slide the cable connector into the receiver and rotate the plastic bayonet sleeve clockwise to lock the connector. The bayonet sleeve will “click” when it fully engages and locks. To remove the cable, rotate the bayonet sleeve counterclockwise until it “clicks” and pull the connector down or away from the Roof Module.

Note: Do not force the connector. If the connector does not engage easily, check for the correct orientation of the connector.

Figure 7-8 Attach Roof Module Eth Connector



3. Route the Main Cable Harness along the back of the quick attach rail and secure with cable ties as shown in Figure 7-9.

Note: Figure 7-9 shows the cable being run on a Challenger cab. Follow the same instructions for running the cable on an AGCO or Massey Ferguson cab.

Note: Do not attach the cable ties around the top or bottom parts of the Roof Rail bracket as this will prevent the Roof Module from freely sliding along the Roof Rail when it is installed and removed.

Figure 7-9 Route Cable to Right of Cab



4. Route the harness down the back of the cab and secure with cable ties to the rear handle bar as shown in Figure 7-10.
5. Route the Main Cable Harness into the cab through the wire access port.

Figure 7-10 Secure Cable to Rear Handle Bar



SA Module Harness

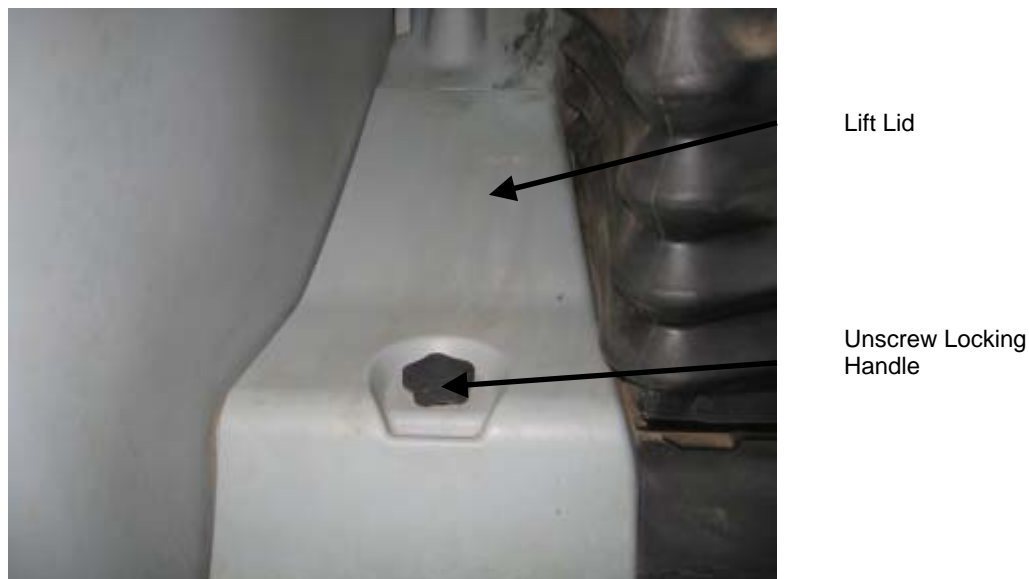
1. Connect the 12-pin data and 2-pin power connectors between the Main Cable Harness and the SA Module Harness where they meet. See Figure 7-11.

Figure 7-11 Connect SA Module Data and Power Connectors



2. Open the compartment to the right of the operator's seat on the floor. See Figure 7-12.

Figure 7-12 Side Compartment



3. Neatly coil and secure any excess cable and place it in the compartment

4. Feed the Main Cable Harness connectors out of the compartment and close the lid as shown in Figure 7-13.

Figure 7-13 Secure Excess SA Module Harness



5. After all the cables and hoses have been run and secured, replace the vehicle side panels that were removed and close the hood.

Main Cable Harness Connections Inside Cab

- Figure 7-14 shows the cable connectors on the Main Cable Harness. Table 7-1 shows what each connector should be connected to. Refer to the Display user manual for instructions on connecting the Main Cable Harness to the Display and the Display Harnesses.

Figure 7-14 Main Cable Harness Connectors

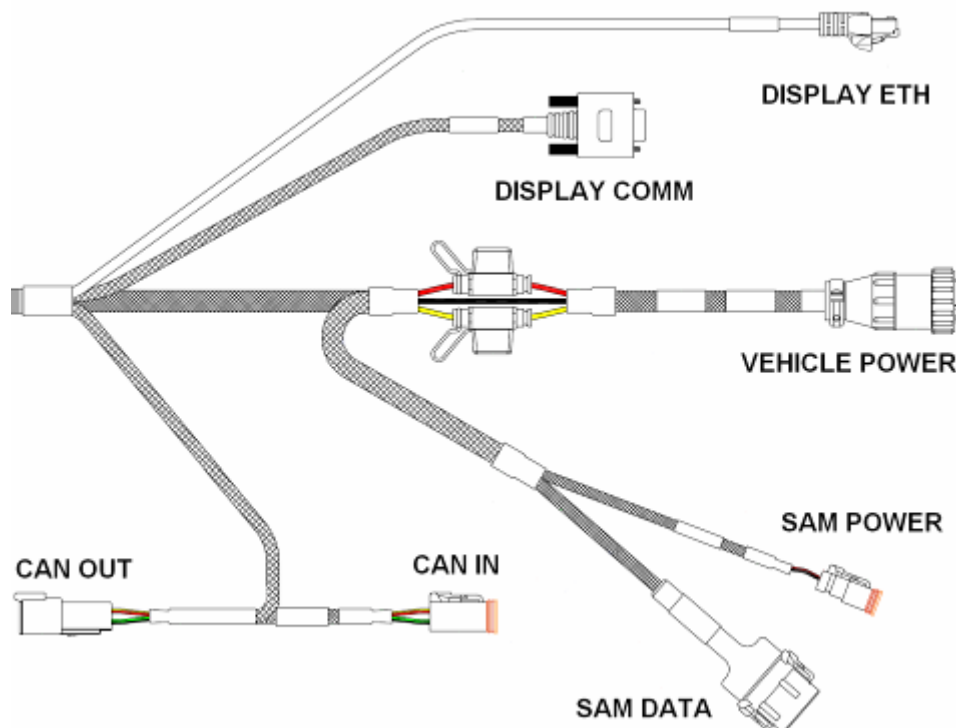


Table 7-1 Main Cable Harness Connections

Main Cable Harness Connector	Connected to
DISPLAY ETH	Display Ethernet Port (RJ-45)
DISPLAY COMM	Display Communication Port (DB-9)
VEHICLE POWER	12 Volt Power
SAM POWER	Power to SA Module Harness
SAM DATA	Data to SA Module Harness
CAN IN	Not Used in this Installation
CAN OUT	Not Used in this Installation

Power Supply Connection

The following sub-sections describe basic instructions for connecting the AutoSteer system to available vehicle power sources:

- *Cab Power Connection*
- *Small Frame Battery Power Connection*
- *Large Frame Battery Power Connection*

Note: Refer to your Display user manual before connecting the AutoSteer system to vehicle power.

The AutoSteer Main Cable Harness must be connected to a 3-pin 12V power source. Your Display user manual provides specific instructions for connecting power to the AutoSteer system and specifies the appropriate vehicle power source.

Cab Power Connection

1. Locate the 12V power outlet behind the seat on the back side of the side console. See Figure 7-15.
2. Use this 12V accessory power connector only if the Display user manual specifies connecting to power inside the cab.

Figure 7-15 Accessory Port



Accessory Port

Small Frame Battery Power Connection

1. Identify the battery compartment on the right side of the cab just ahead of the steps shown in Figure 7-16.

Figure 7-16 Battery Compartment Location



Battery Box Hand
Screw

Battery Box

2. Unscrew the Battery Box Hand Screw and pull the cover off. The batteries are shown in Figure 7-17.
3. Connect to the vehicle battery only if the Display user manual specifies a direct battery connection.

Figure 7-17 Vehicle Batteries



Batteries

Note: A battery cable is provided with the AutoSteer system when a direct battery connection is required.

Large Frame Battery Power Connection

1. Identify the battery compartment at the top of the steps shown in Figure 7-18.

Figure 7-18 Battery Compartment Location



2. Release the Battery Box Latch and pull the cover off. The batteries are shown in Figure 7-19.
3. Connect to the vehicle battery only if the Display user manual specifies a direct battery connection.

Figure 7-19 Vehicle Batteries



Note: A battery cable is provided with the AutoSteer system when a direct battery connection is required.

Post-Installation Procedures and Information

The **Post-Installation Procedures and Information** chapter provides information in the following sections:

- *Create New Vehicle*
- *Hydraulic Leak Test*
- *Pressure Relief Valve Adjustment Procedure*
- *Calibration and Tuning Guidelines*

Once the entire AutoSteer system, including the Display and Display harnesses, have been installed on the vehicle, the procedures and notes provided in this chapter must be followed to complete the installation and prepare the vehicle for full AutoSteer capabilities.

Create New Vehicle

Note: Do not start the vehicle until after the Hydraulic Leak Test has been performed on the vehicle.

The operator must first create a new vehicle profile. This configures the hardware so the Display can properly communicate with the various sensors and components on the vehicle. Follow the procedure below to create a new vehicle.

1. Ensure that the vehicle is still in Park and/or the park brake is set to prevent the vehicle from moving.
2. Ensure the vehicle is off. Do not start the vehicle yet.
3. Power up the AutoSteer system
4. Follow the instructions provided in the Display user manual to create a new vehicle.


Note: Select Hydraulic Steering Valve as the controller for the specific vehicle model when setting up your vehicle on the AutoSteer system Display


5. When the setup wizard gets to the Calibration and Tuning screen, exit from the wizard and shut down the AutoSteer system.

Note: Do not start the vehicle if told to do so until after the Hydraulic Leak Test and Pressure Relief Valve Adjustment Procedure have been performed on the vehicle. After the vehicle has been created, shut down the AutoSteer system prior to starting the vehicle.

Hydraulic Leak Test

On completion of installing the entire AutoSteer system including the Roof Module and Display, the system needs to be checked for leaks. Follow the procedure below to check for leaks.

	⚠ WARNING
	High-Pressure Fluid Hazard Read this manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

	⚠ WARNING
	Prior to starting the vehicle, verify all people and equipment are clear from around the vehicle and the AutoSteer system is powered down. The vehicle could move unexpectedly and cause injury or death to bystanders.

1. Clear any bystanders away from the vehicle. If there is a hydraulic leak, they could be injured.
2. Put the vehicle into Park and/or set the park brake to prevent the vehicle from moving.
3. Turn the vehicle over for a few seconds and if the vehicle starts, immediately shut it down.
4. Walk around the vehicle and check all the hydraulic fittings that were opened. Look for any oil leaks.
5. Once all leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.



Note: If an oil leak is noticed during any part of this test, immediately shut down the vehicle and repair the leak.



6. Take the vehicle out of Park and/or remove the parking brake. Turn the steering wheel manually to the right and left stops two or three times to get any air out of the hoses.
7. Confirm the wheels on the steering axle turn in the correct direction and that the steering system steers the same as it did before the AutoSteer system was installed.
8. Put the vehicle back into Park and/or reset the parking brake. Shut down the vehicle, walk around it again, and check for any hydraulic leaks.
9. Once the leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.
10. Take the vehicle out of Park and/or remove the parking brake. Move the vehicle to an open, flat area and leave the vehicle running.
11. Power up the AutoSteer Display.
12. Follow the instructions in the Display user manual to navigate to the **Vehicle** window from the **AutoSteer Setup** screen. Select **Steering Components**, and then select **Hydraulic Valve**. If the safety screen requirements have been met, press the **Continue** button.
13. Press the **Steer Right** and the **Steer Left** buttons several times to force the wheels to turn back and forth. The wheels should turn in the direction it is commanded. If the wheels turn in the wrong direction, the hoses were attached to the wrong ports on the Steering Valve and need to be switched.

14. Power down the Display, put the vehicle into Park and/or reset the parking brake, and shutdown the vehicle.
15. Once again check the vehicle for hydraulic leaks and repair any that are found.

Pressure Relief Valve Adjustment Procedure

The Steering Valve has a built-in load sense relief valve that limits the maximum pump pressure when AutoSteering. The pressure relief valve must be adjusted after the entire AutoSteer system has been installed and the system has been checked for hydraulic leaks. The Display, Roof Module, and all harnesses must be connected prior to performing this procedure.

	<div data-bbox="651 520 914 562"> WARNING</div> <div data-bbox="591 583 886 611">High-Pressure Fluid Hazard</div> <div data-bbox="433 611 1049 720">Read the user manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.</div>
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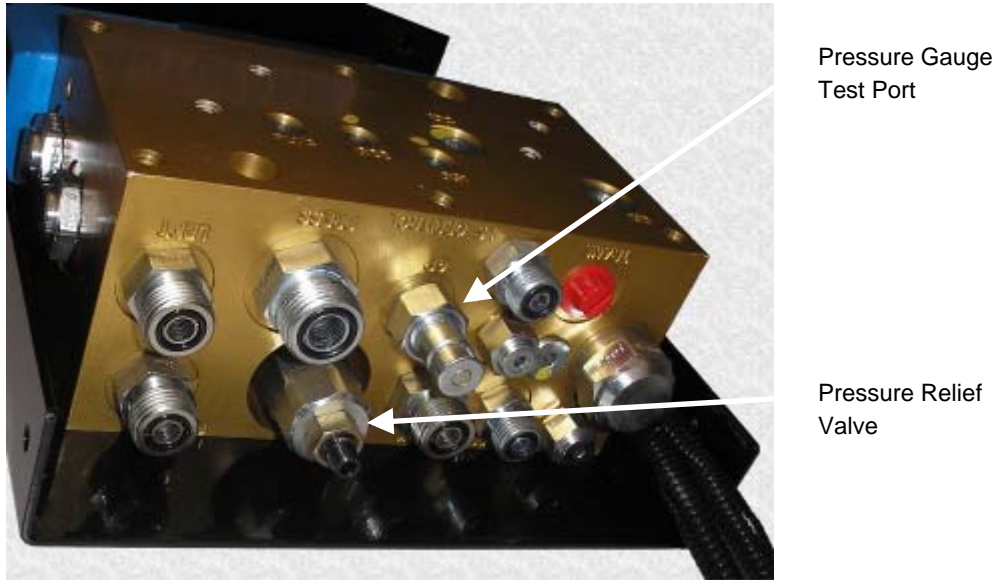
	<div data-bbox="651 852 914 894"> WARNING</div> <div data-bbox="433 915 1062 1024">Prior to starting the vehicle, verify all people and equipment are clear from around the vehicle and the AutoSteer system is powered down. The vehicle could move unexpectedly and cause injury or death to bystanders.</div>
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Note: This vehicle has two separate pumps and hydraulic circuits, one for the steering system and the other for the Power Beyond system. Both circuits share a common oil reservoir.

Note: The following instructions are specific for the AGCO RTXXXA, AGCO DTXXXA, Challenger MT5X5B, Challenger MT6X5B, Massey Ferguson 74XX, and Massey Ferguson 84XX series vehicles. The pressures provided are specific to these vehicle models and do not necessarily apply to other makes or models of vehicles.

Note: Always shut down the vehicle prior to adjusting the pressure relief valve set screw.

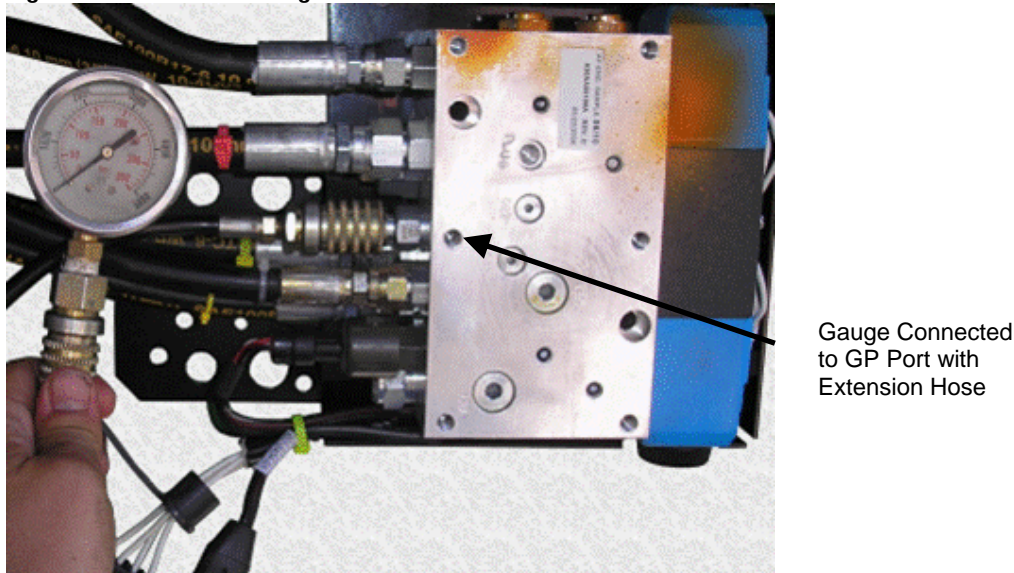
Figure 8-1 AutoSteer Relief Valve Adjustment



Note: The pressure relief valve in Figure 8-1 is shown without the hydraulic hoses connected for ease of viewing the pressure relief valve and pressure test port. When actually adjusting the relief valve, it must be performed with the valve mounted on the vehicle, the hydraulic hoses connected, and the rest of the AutoSteer system installed and operational.

1. Ensure that the vehicle is still in Park and/or the park brake is set to prevent the vehicle from moving and the engine is off.
2. Clear any bystanders from around the vehicle to prevent anyone getting injured when the steering wheels are moved in the following steps.
3. Attach a short extension hose to the quick attach diagnostics port labeled GP on the Steering Valve. Attach a 5000 psi pressure gauge to the extension hose. See Figure 8-2.

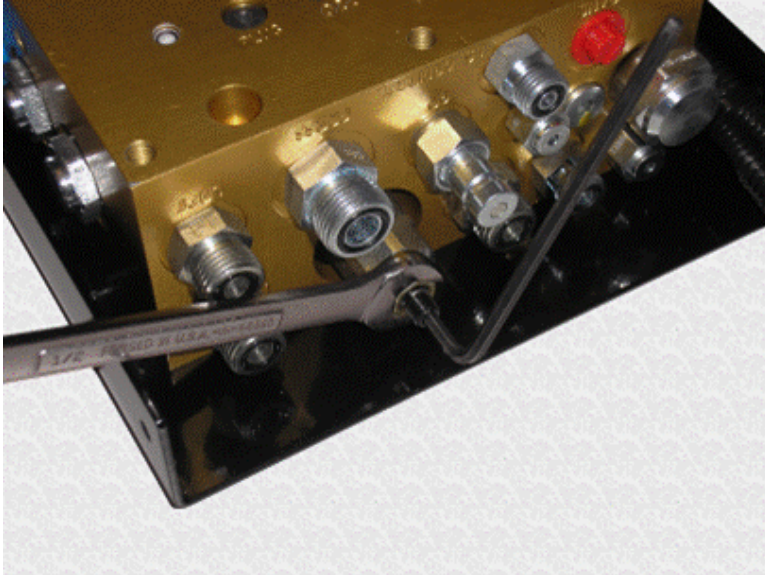
Figure 8-2 Pressure Gauge Attached to GP Port



4. With a 1/2" wrench and 5/32" Allen wrench, loosen the jam nut holding the pressure relief valve adjustment screw as shown in Figure 8-3.

Note: Figure 8-3 shows the Steering Valve with the hoses disconnected for clarity. The Steering valve must be fully connected to the vehicle to adjust the pressure relief valve.

Figure 8-3 Loosening the Lock Nut on Relief Valve



5. Turn the adjustment screw counter-clockwise two turns.
6. Start the vehicle and leave the engine at a low idle.
7. Check the standby pump pressure shown on the pressure gauge. The standby pressure should be around 350 PSI (24 Bar).

Note: If the standby pump pressure is zero or less than 100 PSI (7 Bar), the Pressure and Return/Tank hoses may have been inverted. Confirm the hoses have been attached properly before continuing.

If the standby pump pressure is above 1000 PSI (69 Bar), it is too high. Determine what is causing the pressure to spool up and repair before moving on. Two most likely causes are that some of the hoses have been inverted or an incorrect orifice or plug has been installed in the Steering Valve.

8. Record the actual standby pressure: _____ PSI (Bar).
9. Power up the AutoSteer Display.
10. Follow the instructions in the Display user manual to navigate to the **Vehicle** window from the **AutoSteer Setup** screen. Select **Steering Components**, and then select **Hydraulic Valve**. If the safety screen requirements have been met, press the **Continue** button.
11. Press the **Steer Right** button to command the wheels to turn to the right. Allow the steering axle to reach the right stop and hold it there.
12. The maximum pump pressure allowed by the Steering Valve will be displayed on the pressure gauge.

Calibration and Tuning Guidelines

13. Adjust the pressure relief valve with a 5/32" Allen wrench until the pressure reads 2400 PSI (165 Bar) while the AutoSteer system is commanding a Right turn.

Note: Turn off the engine before adjusting the pressure relief valve. Do not adjust the pressure relief valve with the engine running as there is a chance that a person could get injured if the steering wheels move while working on the valve.

Note: Turn the adjustment screw clockwise to increase the pressure and counter-clockwise to reduce the pressure.

14. Once the pressure relief valve has been adjusted properly, retighten the jam nut with a 1/2" wrench while holding the adjustment screw with a 5/32" Allen wrench to lock it into place.
15. Record the final maximum pressure the pressure relieve valve is set to: _____ PSI (Bar).
16. Press the **Stop** button and confirm that the pressure drops back to the standby pressure within a second.

Note: If the pump pressure remains high after pressing the **Stop** button, the pump is remaining stroked up. Confirm that the Orifice has been installed in port 13A and that the Orifice hole is not plugged.

17. Shut down the AutoSteer Display, turn off the engine, and remove the pressure gauge from the Steering Valve by sliding the sleeve on the quick release coupler
18. Replace the Steering Valve cover on the valve and tighten the four Allen screws with 3/16" Allen wrench.
19. This concludes the pressure relief valve adjustment procedure.

Calibration and Tuning Guidelines

Note: For optimal steering performance, the AutoSteer system must be fully calibrated and then tuned

1. After finishing the *Hydraulic Leak Test* and *Pressure Relief Valve Adjustment Procedure* sections, start the vehicle and move it to an open area.
2. Power up the AutoSteer Display.
3. Follow the instructions in the Display user manual to navigate to the **Vehicle** window from the **AutoSteer Setup** screen. The current vehicle should have already been set up and selected during the **Create New Vehicle** section, if not, select the current vehicle profile in the **Manage Vehicle** screen.
4. Select **Auto Calibrate** from the **Vehicle** screen and follow the on screen procedure to calibrate the vehicle.
5. Once the calibration has completed, follow the instructions provided by the Display user manual to Tune the vehicle if performance is not adequate.

Final Hardware Installation Checklist

This **Final Hardware Installation Checklist** contains the verification steps necessary after the installation of the AutoSteer system.

Note: The Final Hardware Installation Checklist is on the back of this page. Tear this page out of your manual and fill in the checklist after the installation. You should keep a copy of this checklist for future reference when servicing the AutoSteer system.

Machine Model: _____ Year: _____ Serial #: _____

Customer Name: _____

Location/Address: _____

AutoSteer Installation Kit Part Number: _____

NOTES

Name of Installer: _____ Date: _____

System Installation Checklist

1. Wheel Angle Sensor installed and all fasteners are tight. (optional) ☐
2. Display Bracket installed and all fasteners are tight. ☐
3. Display installed and all fasteners are tight. ☐
4. Roof Rail and Roof Module are installed and all fasteners are tight. ☐
5. SA Module is installed and all fasteners are tight. ☐
6. All cable ends are connected. ☐
7. All cables are secured with cable ties. ☐

Hydraulic Installation Checklist

1. Steering Valve Bracket is installed and all fasteners are tight. ☐
2. Steering Valve is installed and all fasteners are tight. ☐
3. All hose fittings are tight. ☐
4. Check for oil leaks on all hydraulic connections. ☐
5. All hoses are routed and secured with cable ties. ☐
6. Manual steering is normal after the AutoSteer installation. ☐
7. Relief Valve is adjusted. ☐ Static: _____
☐ Manual: _____
☐ AutoSteer: _____

AutoSteer Performance Checklist

1. Complete the AutoSteer system calibration. ☐
2. Complete the AutoSteer system tuning ☐
3. Check total Wheel Angle Sensor counts. (if installed) ☐ Left: _____
☐ Center: _____
☐ Right: _____
4. Line acquisition is satisfactory. ☐
5. On-line steering is satisfactory. ☐
6. Manual override (kick-out) is working. ☐ Static: _____
☐ Kick-Out: _____
7. Check that Manual Steering speed is the same as before the installation. ☐ Before: _____
☐ After: _____
8. Steering speed lock to lock is satisfactory. ☐ Time: _____ Sec.

Note: See the *Post-Installation Procedures and Information* chapter for additional information
